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ABSTRACT

A description of the 1974-75 Michigan Cost-Effectiveness Study and its findings is provided in this study. The present study is restricted to compensatory education reading programs. Its purpose is the development of the analytical techniques reflected in the cost-effectiveness model. A purpose of the study is the investigation of the direction of the relationships between achievement and various identified variables. Although all of the possible analyses on the data are not completed, the development of various path models present a major step in identifying the nature of the significant relationships between various variables and reading achievement. This study focuses upon educational variables which can be changed or controlled by educational systems. Variables such as race, social economic status, level of parental education, etc. which can not be readily controlled or modified by an educational system are not examined. (Author/AM)

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ED134634

REPORT OF THE 1974-75 MICHIGAN COST-EFFECTIVENESS STUDY

Prepared by Research, Evaluation, and Assessment Services of the Michigan Department of Education

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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FOREWORD

We are very pleased to present "Report of the 1974-75 Michigan Cost-Effectiveness Study." This report represents an effort to develop ways and means to identify what actions or conditions lead to quality education for children and youth. The 1974-75 Michigan Cost-Effectiveness Study also provided important information describing key aspects of quality compensatory education reading services.

This report has been prepared by the Education Program Evaluation Unit with assistance from the project contractor, Education Turnkey Systems, Inc. Questions or requests for additional information relative to the data contained in this report may be directed to Dr. Michael G. Hunter; Research, Evaluation and Assessment Services; Michigan Department of Education.

John W. Porter
Superintendent of Public Instruction

PUBLISHER'S NOTE

School officials searching for ways to improve student learning sat up and took notice recently when Education Daily reported on a Michigan study that shows money -- and how you spend it -- can make a significant difference in the reading achievement of disadvantaged students.

That story, reprinted on the following pages, brought hundreds of inquiries from school systems everywhere and convinced us that the Michigan experience is important enough to be told in full. Our news story was only a brief summary of highlights from the study done by the Michigan Department of Education, with emphasis on school variables that show a strong relationship to reading achievement. Technical details -- the how-to-do-it aspect of the study -- were omitted.

In this volume we present Michigan's own story, what they found and how they did it. We're grateful for the help of Dr. Michael G. Hunter, Coordinator of Michigan's Educational Program Evaluation Unit, who had primary responsibility for preparation of this report and who made it available to us and to our readers.

Emily C. Harris, Editor
Education Daily

MICHIGAN LEARNS HOW TO BUY BETTER READING ACHIEVEMENT If Michigan schools put into practice some of the things learned in a study of the best and the worst compensatory education reading projects around the state, teachers may be working longer hours, choosing more of the materials used in their own classrooms, getting more training before they launch new projects, and using fewer teacher aides.

What's more, they'll be happier in their work, their students will be reading better, and their principals will be more satisfied with their accomplishments.

That's the picture that emerges from a recent report on the Michigan Cost-Effectiveness Study done by Education Turnkey Systems, Inc. of Washington, D. C. It doesn't differ substantially from an earlier preliminary report but it carries the weight of an additional year's data and more sophisticated analysis than before.

Spending More, Achieving More Michigan superintendent John Porter says two findings of the study are particularly significant.

"First, we found that districts with highly successful reading programs spent significantly more on their reading programs--as opposed to using the funds for mathematics, social studies or other compensatory education programs--than districts with unsuccessful programs," Porter said. "On the average, the successful programs spent significantly more than $635 per pupil, versus nearly $459 per pupil spent by unsuccessful programs." There was no significant difference in the overall per-pupil expenditure at the school district level.

Second, Porter said, "wise application of the funds" was essential to successful reading programs. Success was measured by grade equivalent gains on a month per month-in-program basis, using standardized tests administered by the participating districts.

What's Wise? Three specific activities proved to be a good investment, yielding a "significant positive correlation with program achievement results." These were classroom reading activities, planning, and decision making. Of the three, money spent for decision making (basically staff time) right in the school building had the highest correlation with reading achievement.

Contrasing 50 successful comp ed reading programs with 42 unsuccessful ones, Turnkey found about a dozen variables or groups of variables which were significantly related to reading achievement over one or both years of the study. Among these were the "degree to which accountability was implemented" and the "degree of program organization," both showing the higher the degree the better the reading results.

(more)

Other variables that proved important to achievement were the number of teacher working hours at the school daily, the fraction of materials selected by the teacher, and the days of training provided for teachers at the onset of the project. In each case, the more the better.

Bad News Perhaps the most distressing finding is that the presence of a paraprofessional--generally thought of as a warm, motherly teacher's helper--could be having a depressing effect on the children's reading achievement. The more money schools spent on paraprofessional training and involvement, the lower the reading scores, Turnkey found.

"You certainly can't say that if you hire paraprofessionals it will ruin your project," cautions Turnkey project director Jack Sweeney. "No cause and effect has been established." But after making the same discovery last year, Sweeney said Turnkey decided to ask some additional questions this time to try to find out what happened.

Most high achieving schools said they didn't use paraprofessionals at all, Sweeney explained, but those that did tended to hire full-time aides who were capable of handling actual classroom instruction, "almost like a second teacher." Low achieving schools used more part-time untrained aides such as parents, students from other schools, and local community residents.

"Somewhat Sensitive" The role of the paraprofessional is a "somewhat sensitive area," concedes Turnkey president Charles Blaschke, and their findings on that score have not exactly gladdened the hearts of Michigan school officials. Still, Blaschke sees "serious policy implications" for ESEA Title I projects, which routinely employ thousands of full and part-time aides.

That Old School Spirit Just as they discovered in the first round of their study, Turnkey again found teacher morale higher in successful projects than in unsuccessful ones. Although it's still impossible to tell whether the children are reading better because their teachers are happier or the other way around, it seems to go along with the high positive correlation for planning and decision making, for teacher selection of classroom materials, and for more hours on the job. Blaschke sees these findings as perhaps the most significant of all.

"No matter what," he says, "the schools better get out there and get those teachers involved in planning and making decisions about what goes on in their classrooms."

SECTION I

INTRODUCTION

The purpose of this report is to provide a description of the 1974-75 Michigan Cost-Effectiveness Study and its findings. This report is comprised of ten sections. In addition to this Introduction, there are:

Section II	-	Summary of the First Year's Study
Section III	-	Purpose of 1974-75 Study
Section IV	-	Study Design for 1974-75
Section V	-	Description of 1974-75 Study Tasks
Section VI	-	Description of 1974-75 Study Sample
Section VII	-	1974-75 Achievement Results for Study Sample
Section VIII	-	Cost Analyses for 1974-75 Study
Section IX	-	Effectiveness Analyses
Section X	-	Summary and Conclusions

As was the case with the first year of the study, 1973-74, the 1974-75 study was restricted to compensatory education reading programs. The study was an effort to develop and implement evaluation techniques which can determine what educational practices bring about changes in student behavior and what costs are associated with those practices. Information about those educational practices and their associated costs would provide a rationale for planning. This rationale for planning would provide the base for educators to develop new programs and modify existing programs to improve services to students.

The cost-effectiveness study focused upon educational variables which could be changed or controlled by educational systems. Variables such as race, social economic status, level of parental education, and so forth, which cannot be readily controlled or

modified by an educational system were not examined. It was the intent of the study to examine those aspects of educational policy and practices which could be changed to bring about a higher quality of education for students.

The term program effectiveness, as used in this study, includes a consideration of both program success and activities associated with the program. Program success is attained when the objectives of a program are attained, i.e., an increase in student reading achievement. To establish program effectiveness requires further investigation of the question, "Why was the program successful?" To be termed effective, the activities of the program must contribute to the success of the program, i.e., there is a strong indication that the activities brought about the achievement of the objectives.

Both successful and unsuccessful reading programs were included in the study. The question might be asked, "Why would someone want to look at unsuccessful programs if they were trying to find out what makes a successful program?" The answer to that question is fairly simple. If a person were to look at a group of successful reading programs, they would probably find that all of those successful programs have a program director, provide reading teachers, and provide an assortment of reading materials. However, if that same person were to look at unsuccessful reading programs, they would probably find that those programs also have a program director, have reading teachers, and provide an assortment of reading materials. The information obtained from examining the unsuccessful reading programs would show that having a program director, the presence of reading

teachers, and an assortment of reading materials are not unique aspects of successful reading programs. Discovering what is unique about successful reading programs can only be accomplished by looking at both successful and unsuccessful programs.

SECTION II

SUMMARY OF THE FIRST YEAR'S STUDY

Initial Design

The design implemented the first year, 1973-74, consisted of two components. An effectiveness component was developed and integrated into the cost component derived from the COST-ED model.[1] The criterion for measuring effectiveness was grade equivalent gains measured on a month per month in program basis, using standardized norm-referenced tests administered by participating districts. Process variables (discussed later) were used as independent variables and, through various analytical techniques, were contrasted between successful and unsuccessful programs to determine if any significant relationships existed. The COST-ED model was modified and used to determine the costs associated with variables and practices significantly related to program success. The above design features were implemented during the 1973-74 school year.

Site Selection

Selecting sites for participation in the study was conducted as follows:

1) calculation of month to month reading gains for over 500 school districts implementing Chapter 3 and Title I programs using the 1972-73 test data available at the Michigan Department of Education (MDE);

2) ranking the districts according to program net reading gains;

3) identifying the top fifty and the bottom fifty districts using the above criterion; and

4) randomly selecting twenty-five districts from each of the outlying groups.

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[1] COST-ED, Education Turnkey Systems, Inc., Washington, D.C.

Prior to final selection, six criteria were applied to ensure as much program stability as possible. After replacing LEAs which did not meet the criteria, the resulting sample consisted of 25 successful and 23 unsuccessful districts from which the highest scoring (from successful districts) or lowest scoring (from unsuccessful districts) schools within the prospective districts were selected as summarized in Table 1.

TABLE 1

1973-74 SAMPLE SCHOOLS

	HIGH ACHIEVING	LOW ACHIEVING	TOTAL
Title I	18	17	35
Chapter 3	7	6	13
TOTAL	25	23	48

Development of Data Collection Instruments

Anticipating the availability of funds for the study during school year 1973-74, an initial effort was conducted in the spring of 1973 to develop and field test data collection instruments in twelve sites. While existing interview techniques were reviewed for appropriateness, the resulting five "structured" interview instruments mostly reflected the experience of the TURNKEY staff. The resulting instruments, refined after field testing,[2] were structured in nature and different for each of the five respondent types, which included the director of

[2]This refining process included a search of those items shown in the bibliography. Variables shown to be of importance by those sources were included in the instruments.

compensatory education, the principal of the study school, compensatory education reading teachers, regular classroom teachers, and others such as paraprofessionals involved in the program.

Data Collection

The data collection phase of the first year's effort consisted of two parts:

1) selection and training of data collectors; and

2) collection and processing of data.

A team of ten data collectors was selected most of whom had advanced degrees of education or prior experience in the classroom. In a two day training session, the data collectors were trained in the use of the interview instruments. Care was taken to ensure that the data collectors were not aware of the nature of the study and other factors which might have influenced responses during the on-site data collection activities.

Data collection was conducted over a two month period ending in April 1974. The average data collector visited seven sites, interviewing eight respondents each with interviews averaging 55 minutes in duration. Minor problems which were encountered included the scheduling and rescheduling of sites, the scope of data requested, and some confusion with other MDE evaluation efforts.

Data Analysis

The data analysis phase included two major tasks:

1) determining the degree to which process variables were significantly related to achievement scores; and

2) the use of the COST-ED model to identify the cost of those variables associated with success.

In conducting the effectiveness analysis, approximately 450 variables, not including cost variables, were analyzed to determine relationships with program success. A large number of items were not included in this effort for various reasons, such as incomplete data.

Simple discriminant techniques were used to identify those variables showing significant contrasts between high achieving and low achieving sites. The use of more complex types of analysis was limited due to missing data.

The cost analysis included the development of cost models for each of the forty-eight compensatory education programs. Each program was modeled to include one activity in which the student was involved (classroom reading) and four supportive activities not involving student's time directly (planning, training, decision making, and administration). The specific methodology for identifying and allocating cost is described in detail in Section VIII. It is important to note that the cost data gathered includes all resources allocated to the program in question rather than just those contributed by Chapter 3 and/or ESEA Title I.

SECTION III

PURPOSE OF 1974-75 STUDY

The MDE Executive Summary[3] includes the following conclusion:

"To achieve full benefit of the 1973-74 study, it should be continued in 1974-75. The continuation should:

1) identify new variables which relate to achievement;

2) extend relationships between cost and achievement; and

3) investigate the direction of relationships between achievement and the various identified variables."

It may be understood from the above, in conjunction with the previous section, that the overall purpose of the 1974-75 study efforts is the continued development of the analytical techniques reflected in the cost-effectiveness model. However, a critical part of this continued development must be considered to be a cross-validation effort focusing upon the variables identified and reported in the executive summary of the 1973-74 study. Thus, Section IX of this report, which presents the results of this year's study, reports first on the results of the cross-validation effort. This order of reporting reflects the importance of cross-validation. Without some evidence upon which to anchor the overall findings — evidence that involves the demonstration of significant results over more than one year of the study -- it might well be argued that any other findings are greatly lessened in their impact.

Following, in importance, the cross-validation of the reported results of last year's effort is the identification of new variables which relate to achievement. Appendix A lists those variables.

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[3] Michigan Cost-Effectiveness Study: An Executive Summary, Michigan Department of Education, April, 1975.

The bulk of the work reported in Section VIII of this report details the extended relationships investigated between cost and achievement. This extension is both of a refinement nature where data management and reduction techniques were involved and of a broadened analysis nature where costs provided from various funding sources are analyzed, a series of analysis not possible using last year's data.

The last of the three stated purposes of the 1974-75 effort, the investigation of the direction of the relationships between achievement and various identified variables, is addressed in Section IX. Time constraints and the volume of data, with the concommitant data management needs, prevented all of the possible analyses from being completed. However, the development of the path models presented in Section IX do represent a major step in identifying the nature of the significant relationships between various variables and reading achievement.

The 1974-75 study effort was designed to meet these goals; the extent to which each goal has been met is well reflected in the pages that follow. The model, first began in the spring of 1972 and further developed through the 1973 pilot and the 1973-74 study effort, has seen still further developmental progress through the 1974-75 study effort. Instruments have been modified to remove uninteresting variables and pursue interesting areas in greater depth. Data management and analysis techniques have been simplified and refined. The cost analysis methodology has been critically examined, expanded to include estimates of costs provided from various funding sources, and refined through an overall improvement of the consistency of data collection and management techniques.

SECTION IV

STUDY DESIGN FOR 1974-75

For the 1974-75 study year, a number of changes in the overall study design were carried out. During the previous study year, one building per study site has been included in the sample. This building was the outlier building for that site, high achieving outlier for high achieving sites and low achieving outlier for low achieving sites. For the 1974-75 study year, two buildings per study site were included in the sample, both high and low achieving outliers from each site, regardless of whether the site was selected as a high or low achieving site. This basic change in the design was carried out in order to examine the relationships between the characteristics of schools, within a school district, and reading achievement.

The move from one to two buildings per site had a direct impact on at least one aspect of the study sample for the 1974-75 year. A number of the districts included in the 1973-74 sample were districts which had only one elementary school building. For the 1974-75 study year, districts having only one elementary school were not included in the study due to the requirement of two buildings per site. Thus, the study sample for 1974-75 tended to include districts which on the average were larger than the previous year's study sample.

This move from one to two buildings per study site also had a direct impact on the task of scheduling data collection visits for any given site. Working with the constraint of having to complete an on-site data visit during two consecutive school days, one day per school, caused a major increase in the problem of coordinating available

data collection dates. Consecutive day scheduling, when relying upon one collector per site for increased inter-rater reliability of recorded responses from that site, was the way chosen to minimize the potential for contamination resulting from communication between personnel of the two schools.

SECTION V

DESCRIPTION OF 1974-75 STUDY TASKS

This section of the report describes the tasks carried out as part of the 1974-75 study effort. The description will be both chronological and topical covering all major study tasks starting with site selection for this year's sample and proceeding up to the analytical tasks described in the remainder of the report.

Selection of Sites and Scheduling Contacts

Following the overall dimensions intended for the 1973-74 study, the site selection process resulted in identifying 25 districts which were highly successful in their compensatory education reading programs and 23 that were highly unsuccessful. Thirty-six of these 50 districts were to be included for their Title I programs; 14 for their Chapter 3 programs.

Similar to what was done in the previous year's effort, selection of the successful and unsuccessful Title I sites began by reviewing the 1973-74 Title I evaluation reports of approximately 500 LEAs (Local Education Agencies) and LEA co-ops to rank the 36 highest achieving and 36 lowest achieving programs based on the average months gained per month in the program in reading achievement. The following guidelines were followed:

1) adequate program description had to be available for the district;

2) student population turnover for the district had to have been less than 40 percent;

3) the district had to have at least two schools;

4) each school had to have at least 2 grades between grades 2-6 with 15 or more compensatory education students in each grade, thus requiring a minimum of 30 students in the district's program;

5) reading test results on MDE acceptable reading tests were used for comprehension if available, for vocabulary if comprehension results were not available, or for total score if neither sub-test result was available;

6) the pretest must have been given prior to December 1973;

7) at least 7 months had to have elapsed between pretest and posttest;

8) where no specific date was specified for the month in which the tests were reported to have been administered, it was assumed that the test was administered in the middle of the month;

9) the program length was rounded to the nearest 0.5 month;

10) where specific test dates were provided, it was assumed that the days of the month numbered from 1-10 was the beginning of the month, 11-15 was the middle of the month, and 21-31 was the end of the month;

11) months gained per month in the program was calculated for any grade level from grade 2 through 6 where at least 5 students participated in the testing;

12) these grade averages, in turn, were averaged to form a program average; and

13) month per month gains were recorded to the nearest hundredth.

Use of these guidelines allowed the 72 Title I programs, 36 at each end of the achievement spectrum, to be identified from which the desired number of 18 programs at each end would be selected.

Paralleling this detailed effort for the Title I programs, the 14 highest and 14 lowest achieving Chapter 3 districts were also identified. As was necessary last year, percentage of accomplishment was used to determine the performance levels rather than month per month gains. Reading achievement results were used to rank all Chapter 3 districts in terms of the percent of their Chapter 3 students reaching at least the 75 percent level of accomplishment. This ranking was then used to identify the desired Chapter 3 sites.

Both the Title I and Chapter 3 pools of sites were deliberately selected as being double the size needed to allow replacement of sites initially selected where additional program stability criteria caused a site to be dropped from inclusion in the sample. The initial 50 sites, reflecting the dimension indicated in the opening paragraph of this discussion, were randomly selected from the pool of Title I and Chapter 3 sites just described.

Additional school level screening criteria were then applied to these sites through written and telephone contact. These criteria were:

1) the compensatory education program (Title I or Chapter 3) was in existence by the fall of 1973;

2) the program had the same key persons (e.g., reading coordinator) as in 1973-74; or the same key persons provide the same services to the program as were provided the previous year, even though these persons may hold different titles or be in different locations;

3) the school building had the same principal as in 1973-74;

4) teacher turnover in the building was less than 40 percent;

5) there were at least five compensatory education students per participating grade level; and

6) the materials used were essentially those used in the previous school year.

Through these written and telephone contacts, the selected districts were asked to identify their three highest achieving schools meeting the above listed criteria and their three lowest achieving schools meeting these same criteria. Direct contact with the identified buildings then allowed verification of the information provided by district level correspondents and, eventually, specification of the two schools to be studied.

Problems of program stability in the low achieving sites, similar to those encountered last year, prevented the desired 50 sites from being identified and included in the current year's study. Table 2 shows the results of the selection process just described. A total of 96 schools from 48 sites were thus selected including 36 schools from 18 high achieving Title I sites, 36 from 18 low achieving Title I sites, 14 from 7 high achieving Chapter 3 sites, and 10 from 5 low achieving Chapter 3 sites.

This selection process took place during the months of January and February, 1975. Once the sample was identified, scheduling contacts were made directly with each building and district level program coordinator to arrange mutually agreeable site visit dates. These contacts were not one-time in nature, rather an on-going process was followed for each site to assure that a maximum number of relevant program personnel would be on hand during the course of the visit. Scheduling contacts with study sites were made from February to June of 1975.

TABLE 2

SITE/SCHOOL SELECTION FOR 1974-75 STUDY

	TITLE I SITES		CHAPTER 3 SITES		TOTAL	
	No. of Sites	No. of Schools	No. of Sites	No. of Schools	No. of Sites	No. of Schools
High Achieving Sites	18	36	7	14	25	50
Low Achieving Sites	18	36	5	10	23	46
TOTAL	36	72	12	24	48	96

Selection and Training of Data Collectors

TURNKEY's field data team for the 1974-75 study included six members. The on-site data collection activities of these individuals was supervised by the project's data coordinator. The individual serving as data coordinator was the same person who held this position during the previous year of the study; and four of the six data collectors were also data collectors for the study last year. The two new data collectors for this year's effort were both individuals with whom TURNKEY had worked in the past on similar field data efforts. Thus, the 1974-75 data team matched that of the 1973-74 team in background experience and education.

In March of 1975, an intensive one day training session was provided for all members of the data team. This session was supervised by TURNKEY's principal investigator and conducted jointly by the project director and the data coordinator. MDE officials attended this session as well, paralleling their attendance at the training conducted for 1973-74 effort.

This training session covered a number of topics including:

1) a summary of the progress of the 1974-75 study since December of 1974;

2) a discussion of the history of the project through the 1973-74 effort;

3) a detailed description of the procedures to be followed in all aspects of this year's effort; and

4) a detailed review of the instruments to be used.

The specific procedures covered during the session involved:

1) the scheduling and coordinating of site visits with both the site and data coordinator;

2) on-site interview scheduling;

3) instrument administration, recording, and coding responses for each interview;

4) collection of data items not part of the instruments; and

5) forwarding of completed response forms to the data coordinator.

Subsequent to this training session, each data team member received a detailed Data Collector/Coder Manual which included a complete listing of the procedures covered in the session, a review of general interviewing and response coding procedures, lists of data items to be collected from district directors and principals which were not part of the instruments, copies of all correspondence that on-site personnel would have received from the project staff prior to the site visit, specific interview and coding instructions for situations where one interviewee actually played more than one role in the conduct of the subject program (e.g., where a study principal was also functioning as a study teacher), administrative forms and expense sheets, and other information to be used during the on-site visit. This manual was designed to be easily modified so that additional pages could readily be added if needed. This option was exercised a number of times as new situations requiring a consistent procedure arose.

Collection of Data

Data collection took place between March and June of 1975. The procedures followed paralleled those of the 1973-74 effort with a site initially contacted by mail followed by a telephone contact made by the data coordinator. These initial mail and phone contacts, also described earlier in this section, were for the purpose of selection, verification of selection information, and scheduling of the on-site visit. Once both buildings for a site had been identified and scheduled for a visit, letters were sent to the district's director of compensatory education and the principals of each study school confirming these arrangements and alerting these persons to data needs that they might more easily fulfill prior to

the on-site visit. These needs were expressed as specific requests for enrollment data, roster of compensatory education students, and budget documents.

Once on site, the data team representative confirmed their anticipated schedule of interviews with the district director and each study school principal and proceeded to conduct all needed interviews over the two day visit. The typical site visit included interviews with one director, two principals, two compensatory education teachers, six to eight regular classroom teachers, three or four paraprofessionals, plus one other staff for a total of 16-17 such interviews. Last year's visit, confined to one day, included a total of 8-9 such interviews. The time required per interview this year matched closely last year's experience; generally about one hour was required per interview.

A brief description of the typical interview and its setting is appropriate at this point. All interviews were conducted on a one-to-one basis; i.e., only the interviewee and the data collector were present. Two copies of the instrument were used: one for the interviewee to read and one for the interviewer to use for reference. At the outset of each interview the interviewer described the interview task as one requiring the interviewee to read each question and respond verbally. All responses were recorded in the set of response forms uniquely associated with that interviewee. The interviewer read certain questions aloud to the respondent where the question itself was lengthy or complex. Occasionally when the interviewee appeared to digress, the interviewer would read the next question as a cue for the interview process to resume. At no time did the interviewer provide explanatory

information concerning the "meaning" of any specific item. Certain prompting techniques were provided to the interviewer for use in items requiring the respondent to list the allocation of their time, in terms of percentages, for a lengthy list of activities. Suggestions such as having the interviewer focus on the most common activity and on whether this activity occupied 30, 40, or 50 percent of the interviewee's time were made when it became apparent that the interviewee was having difficulty responding to such items.

Once a data collector completed the interviews at a given site and had contacted the principals and director once again to make them aware of this fact, all responses were coded into the keypunch columns of the response sheets. These completed and coded response sheets were then forwarded to the data coordinator for processing. At this point an additional request for data was mailed to each district director. This request was for specific salary data for the persons interviewed on-site. Salary amounts from specific fund sources and in total were requested. Also, 1973-74 test score results for the compensatory education students of the subject schools were requested at this time. Reassurances, matching those already provided on-site by the data collector, concerning confidentiality of the salary data were provided prominently in this letter request. No data containing names of individuals have been provided to the MDE among the bulk of the data turned over from TURNKEY to the MDE for this project. All such data will be destroyed in keeping with the above mentioned assurances.

The number of sites visited by each data collector varied by data collector as follows: 13, 1, 4, 5, 8, 14. Note that only 45 sites are reflected in this listing. The data coordinator visited an additional two sites and the final site was visited by both the data coordinator

(for one school) and one member of the data team (for the other school). The splitting of this final site was due to a time constraint which forced the completion of the entire site visit in one day. All other sites received a two day site visit from a single data collector.

Because the results of the 1973-74 study were made public prior to the 1974-75 on-site visits, it was felt that some measure should be taken to determine the impact of this release on the level of awareness of the study on the part of all persons interviewed this year. Obviously, it would be important to know of this level of awareness in order to ascertain whether the results observed were contaminated by this public release of preliminary study information. The measure chosen was a simple question asked of each of the 808 respondents included in this year's study: "Are you familiar with the results of the first year of this study which were recently released?" The percent of respondents answering yes to this question is shown below for each type of respondent:

1) district directors of compensatory education (48 respondents) -- 15% said yes;

2) principals (96 respondents) -- 6% said yes;

3) compensatory education teachers (87 respondents) -- 5% said yes;

4) regular classroom teachers (356 respondents) -- 2% said yes;

5) paraprofessionals (184 respondents) -- 2% said yes; and

6) other staff (37 respondents) -- 5% said yes.

It was concluded from the above results that, below the level of district director of compensatory education, the study was not widely known, even after the public release of results and the publicity surrounding these results. Even at the directors' level it was not felt that the percent indicating awareness was high enough to cause concern over the issue of

potential contamination. When the reader has completed Appendix A, it will also be apparent that this item, taken as a study variable, showed no significant contrasts between respondents from high and low achieving sites for any of six types of respondents. This would indicate that if contamination occurred at all, it may have occurred in a non-systematic fashion thus not significantly affecting other contrasts reported here.

Searching for Missing Data Items

All response sets were individually screened in order to identify all missing data items and any data inconsistencies. Once all response sets from a given data collector had been so screened, the data coordinator contacted the collector by phone and provided them their list of missing or inconsistent items for resolution. The data collectors then set about to resolve these problems, either correcting mistakes in coding or obtaining additional data from the site in question. In some instances, the missing items could not be provided by the original data collector. The data coordinator resolved all such outstanding data problems by directly contacting the site in question.

Reducing the Raw Data to Analyzable Form

As described earlier in this section, the experience of the study team last year had led to a revision in the data collection/coding/reduction process which allowed keypunching of raw data responses to be done directly from the sheets filled out during the interviews. However, before cards could be keypunched from these forms, a number of steps still needed to be followed. Missing or inconsistent items had to be resolved as was just described. Additionally, the large number

of open-ended responses included in this year's instruments had to be coded for purposes of analysis.

One of the key elements of the instrument revision process this year was the expansion of items found to be significant in last year's results. One method relied upon in this expansion or probing effort was the use of open-ended questions. For instance, since teacher morale was found to be significantly related to reading achievement, this year a question was added to the scaled morale response asking why the respondent thought morale was high (or low) in that school. More than 130 such open-ended items were included in the full set of six instruments used this year. Thus, a major task in reducing raw data to analyzable form was the development of codes for these open-ended responses and the assignment of these codes to the open-ended responses in each of 808 respondent sets. The codes were developed by sampling a number of responses and obtaining a series of codes that fit this sample. The codes were then applied to the entire set of responses. For the most critical codes, a joint effort of the project director and the data coordinator resulted in a set of codes which were then field tested by two raters (or data reducers) on a sample of actual responses. An agreement level of 80% was set as an internal requirement for this field test in order to judge the acceptability of the codes. Where this level was not reached for a particular set of codes, the codes were rewritten in a manner that would serve to most enhance inter-rater agreements based on observed patterns of confusion or disagreement in the field test. Once the codes for all open-ended questions were developed, a staff of data reducers assigned a code to each open-ended response contained in the entire set of 808 respondent sets.

The codes developed for open-ended responses were made a part of the overall project Coding/Analysis Manual, a seven volume document which completely described the list of variables studied, the interpretation of the coding used to describe each variable, and the list of open-ended codes used. Six of these volumes corresponded directly to the six types of respondent instrument/response sets. The seventh volume summarized the groupings of variables, according to the nine groups mentioned earlier, for all six files and enumerated any cross-referenced data existing in the various files (i.e., data from different respondents related to the same specific item). The Coding/Analysis Manual was a key reference document used throughout the data reduction and analysis phase of the study this year.

SECTION VI

DESCRIPTION OF 1974-75 STUDY SAMPLE

In this section of the report background data for the districts and school buildings included in this year's study are presented. The information shown in this section does not include data from four schools in two districts of the entire sample of 96 schools in 48 districts. These two sample sites (both low achieving Title I sites) had no program cost models built for them due to incomplete cost data. Since the discussion to follow in later sections refers to program cost differences across sites, it was felt that this discussion of background characteristics be restricted to the same sites included in the cost analyses.

Comparison of Districtwide Background Data

Table 3 shows the mean and standard deviation for each of 13 districtwide characteristics for the 25 successful sites and the 21 unsuccessful sites for which program cost models could be constructed. Each of the 13 sets of contrasts of these background data from successful sites versus similar data from unsuccessful sites was tested to determine whether the observed differences in means between these two groups of sites was significant at the 0.05 level or lower. None of the comparisons resulted in a significant difference between the 2 groups of sites.

Table 4 shows the mean and standard deviation for each of these same 13 districtwide characteristics for the 34 Title I sites in the 1974-75 sample (including 18 successful plus 16 unsuccessful Title I sites combined) versus the 12 Chapter 3 sites in this sample

TABLE 3

1974-75 DISTRICTWIDE BACKGROUND DATA
SUCCESSFUL SITES VS. UNSUCCESSFUL SITES

BACKGROUND DATA ITEM	SUCCESSFUL SITES n=25 MEAN	S.D.	UNSUCCESSFUL SITES n=21 MEAN	S.D.
Median Family Income in District, Dollars Annually	10,019	1622.1	9,634	1360.8
Total General Fund Expenditure ($) per Student	1,284	286.1	1,153	227.8
Total Compensatory Education Expenditure ($) per Compensatory Education Student (Title I for Title I sites, Chapter 3 for Chapter 3 sites)	320	127.8	378	352.0
Number of Title I Students	356	477.5	459	646.3
Number of Chapter 3 Students	310	541.0	458	652.2
District Enrollment				
Kindergarten	334	221.4	313	315.5
Grades 1-6	1,979	1382.6	1,855	1962.0
Grades 7-12	2,019	1293.1	1,853	1948.5
K-12	4,332	2865.7	4,022	4216.7
Number of Elementary Schools in the District	6	4.8	6	5.9
Number of Title I Elementary Schools	4	2.9	4	2.2
Number of Chapter 3 Elementary Schools	3	5.6	4	6.7
Number of Elementary Schools Which Are Both Title I and Chapter 3	2	3.4	2	3.1

TABLE 4

1974-75 DISTRICTWIDE BACKGROUND DATA
TITLE I SITES VS. CHAPTER 3 SITES

BACKGROUND DATA ITEM	TITLE I SITES n=34 MEAN	S.D.	CHAPTER 3 SITES n=12 MEAN	S.D
Median Family Income in the District, Dollars Annually	9,732	1572.4	10,165	1244.6
Total General Fund Expenditure ($) per Student	1,180	243.3	1,352	298.8
Total Compensatory Education Expenditure ($) per Compensatory Education Student (Title I for Title I sites, Chapter 3 for Chapter 3 sites)*	401	276.1	192	9.3
Number of Title I Students	359	618.8	528	310.5
Number of Chapter 3 Students**	268	628.5	687	328.9
District Enrollment				
Kindergarten	307	284.2	374	205.8
Grades 1-6	1,860	1817.1	2,098	1110.8
Grades 7-12	1,926	1773.0	1,994	1073.3
K-12	4,093	3855.4	4,466	2575.3
Number of Elementary Schools in The District	6	5.8	7	3.7
Number of Title I Elementary Schools	4	2.9	4	1.3
Number of Chapter 3 Elementary Schools	3	6.5	6	3.6
Number of Elementary Schools Which Are Both Title I and Chapter 3***	2	3.5	4	1.2

* Probability of observing this large a difference by chance is 0.012.
** Probability of observing this large a difference by chance is 0.034.
*** Probability of observing this large a difference by chance is 0.014.

(including 7 successful plus 5 unsuccessful Chapter 3 sites combined). Each of these 13 contrasts was tested for significance as before. Three of the data items show a significant difference between the group of Title I sites and the group of Chapter 3 sites:

1) a higher level of per student Title I funding than Chapter 3 funding at the district level;

2) a greater number of Chapter 3 students in the Chapter 3 sites than in the Title I sites; and

3) twice as many elementary schools which are both Title I and Chapter 3 in the Chapter 3 sites compared to the Title I sites.

The first of these differences reflects the levels of funds allocations to be found throughout Michigan when comparing per pupil Chapter 3 funding and the "cut-off" criterion of proportionality used to identify eligible Chapter 3 districts. Chapter 3 was initially funded at $200 per pupil as a maximum; statewide Title I allocations per pupil tend to be approximately twice the Chapter 3 funding level--a situation well mirrored in our sample.

The second of these three significant differences reflects two factors. First, not all the Title I sites also had Chapter 3 programs, thus depressing the average for this characteristic over all Title I sites in the sample. Second, the Chapter 3 sites in the sample tended to be somewhat larger (see below) than the Title I sites, thereby allowing a potentially larger base of Chapter 3 students to be served.

The third of these differences reflects the same issue of Title I/Chapter 3 overlap alluded to above. Specifically, since not all Title I sites also had Chapter 3 programs, the average for this factor is depressed for the overall sample of Title I sites.

Appendix B details the 13 districtwide characteristics considered in Tables 3 and 4 for the high and low achieving Title I and Chapter 3 sites.

Comparisons of School-Level Background Data

Table 5 shows the mean and standard deviation for each of the 7 school-level characteristics for the 50 school buildings in the study sample from the 25 successful sites and the 42 school buildings from the 21 unsuccessful sites. Each of the 7 sets of contrasts of these school level background data for schools from successful sites versus schools from unsuccessful sites was tested for significance. Only one of these contrasts shows a significant difference between the successful site schools and the unsuccessful site schools -- the number of full time equivalent (FTE) compensatory education paraprofessionals. The schools from low achieving sites average 4.01 FTE paraprofessionals while the high achieving sites average 2.28 FTE paraprofessionals. This finding is consistent with the results of the first year of this study.

TABLE 5

1974-75 BACKGROUND DATA FOR SAMPLE SCHOOLS
SUCCESSFUL SITES VS. UNSUCCESSFUL SITES

BACKGROUND DATA ITEM	SAMPLE SCHOOLS FROM SUCCESSFUL SITES n=50 MEAN	S.D	SAMPLE SCHOOLS FROM UNSUCCESSFUL SITES n=42 MEAN	S.D
Total Enrollment, K-6	425	183.0	443	259.0
Total Number of Compensatory Education Students, K-6	83	72.6	100	79.9
Percent of Total K-6 Enrollment Designated Compensatory Education	21	16.1	25	18.9
Total Number of Regular Classroom Teachers, K-6	16	6.2	16	8.8
Ratio of Total K-6 Enrollment to Total Number of Regular Classroom Teachers, K-6	26.9	3.2	28.5	4.5
Number of Full Time Equivalent Compensatory Education Teachers, K-6	1.18	0.88	0.82	0.93
Number of Full Time Equivalent Compensatory Education Paraprofessionals, K-6*	2.28	2.62	4.01	3.20

* Probability of observing this large a difference by chance is 0.006.

Table 6 shows the mean and standard deviation for each of the same 7 school level characteristics, presented in Table 5 , for the 68 schools from the 34 Title I sites (including 36 from the 18 high achieving Title I sites plus 32 from the 16 low achieving Title I sites) versus the 24 schools from the 12 Chapter 3 sites (including 14 from the 7 high achieving Chapter 3 sites plus 10 from the 5 low achieving Chapter 3 sites). Each of these 7 contrasts was tested for significance as before. Three of the characteristics show a significant difference between the group of schools from Title I sites and the group of schools from Chapter 3 sites:

1) Chapter 3 schools had over 50% more compensatory education students than did Title I schools;

2) a higher proportion of the overall student body were designated compensatory education in the Chapter 3 schools than in the Title I schools; and

3) a higher level of FTE compensatory education teachers in the Chapter 3 schools than in the Title I schools.

The first of these findings reflects at least two factors. First, nearly all of the study's Chapter 3 schools were also Title I schools compared to a relatively lower proportion of the study's Title I schools also being served by Chapter 3 funds. The Chapter 3 schools offered more than one program in most instances thus serving a potentially larger audience than schools which mostly offered only a Title I program. Second, where present in a school, the Chapter 3 program usually serves a wider audience of students than would a Title I program operating alone in the same building.

The second of these findings is readily explained as an extension of the first finding because the Title I and Chapter 3 schools in the study were relatively similar in overall enrollment.

TABLE 6

1974-75 BACKGROUND DATA FOR SAMPLE SCHOOLS
TITLE I SITES VS. CHAPTER 3 SITES

BACKGROUND DATA ITEM	SAMPLE SCHOOLS FROM TITLE I SITES n=68 MEAN	S.D	SAMPLE SCHOOLS FROM CHAPTER 3 SITES n=24 MEAN	S.D
Total Enrollment, K-6	437	225.6	422	206.9
Total Number of Compensatory Education Students, K-6*	79	75.7	123	68.7
Percent of Total K-6 Enrollment Designated Compensatory Education**	20	18.2	31	12.2
Total Number of Regular Classroom Teachers, K-6	16	7.7	15	6.9
Ratio of Total K-6 Enrollment to Total Number of Regular Classroom Teachers, K-6	27.5	4.3	27.9	2.5
Number of Full Time Equivalent Compensatory Education Teachers, K-6***	0.87	0.86	1.44	0.95
Number of Full Time Equivalent Compensatory Education Paraprofessionals, K-6	2.86	3.01	3.66	2.99

* Probability of observing this large a difference by chance is 0.013.
** Probability of observing this large a difference by chance is 0.006.
*** Probability of observing this large a difference by chance is 0.008.

The third of these findings, along with the fact that more FTE paraprofessionals (though not significantly more) were present in the Chapter 3 schools, is yet another reflection of the fact that the study's Chapter 3 schools were nearly always served by Title I as well, while only Title I was present in most of the study's Title I schools. The combined fiscal impact of two co-existing programs would account for the presence of more compensatory education personnel in the study schools from Chapter 3 sites than in those from Title I sites.

SECTION VII

1974-75 ACHIEVEMENT RESULTS FOR STUDY SAMPLE

As indicated in an earlier section, a total of 96 schools in 48 sites were included in this year's study effort. Achievement results from the 1973-74 school year for the sites established whether a particular site was included as either a low achieving or high achieving site for this year's effort. The major difference between selecting this year's sample of programs from 48 sites and selecting last year's sample from 48 sites was that this year two schools from each site were studied rather than just one school from each district. The specific schools studied last year at any given site were the lowest achieving building from low achieving sites and the highest achieving building from high achieving sites. This year, the two schools studied in each site were to be the highest and lowest achieving buildings regardless of the success designation of the site.

As part of the overall data collection effort, MDE requests for building specific 1974-75 reading achievement results were made. The data requested for each of two schools (specifically named in the request) per site were:

1) the average gain (in grade equivalent units) for the compensatory education students served by the program of interest (Title I or Chapter 3) in reading achievement as measured by the standardized test used at that site; and

2) the administration dates of the pre and post tests which determined the above average gain scores.

These two items of data were combined into the success measure used in this study as follows:

$$\text{month/month gain} = \text{months gained/months in the program} = \frac{\text{[average gain score (converted to months)]}}{\text{[number of months between pre and post test (to the nearest half month with a maximum value of 10.0)]}}$$

While data in terms of month/month gains were available for all 48 study sites this year on a districtwide basis and all 96 schools included in this year's study initially indicated that the necessary data for computing the above rates would be available for the 1974-75 school year, only 41 sites (82 buildings) were able to provide the necessary data for this task. The other seven sites either did not fulfill the data request, had switched to objective or criterion referenced tests, or reported fewer test scores than was the minimum study criterion for this measure. For the 41 sites (82 schools) which reported the requested data, Table 7 shows the number of buildings reporting, mean and standard deviation for the month/month gain in Building 1 (nominally the highest achieving building at each site which met the study's selection criteria), Building 2 (nominally the lowest achieving building at each site), and Buildings 1 and 2 combined for the following groupings of sites:

1) high achieving Title I sites;

2) high achieving Chapter 3 sites;

3) low achieving Title I sites; and

4) low achieving Chapter 3 sites.

It should be noted that all achievement results displayed in the tables of this section have been rounded to the decimal place shown. All significant testing was performed not using the rounded values shown here but instead the sums of observed achievement results and the sum of the squared values of these achievement results.

TABLE 7

1974-75 ACHIEVEMENT RESULTS (MONTH/MONTH GAIN)
BY BUILDING DESIGNATION AND
BY GROUPINGS OF SITES

	BUILDING 1 ONLY			BUILDING 2 ONLY			ALL STUDY BUILDINGS		
GROUPINGS OF SITES	N	MEAN	S.D	N	MEAN	S.D	N	MEAN	S.D
High achieving Title I sites	14	1.88	0.47	14	1.66	0.71	28	1.77	0.60
High achieving Chapter 3 sites	7	1.73	0.35	7	1.44	0.66	14	1.58	0.53
Low achieving Title I sites	15	1.01	0.40	15	1.07	0.29	30	1.04	0.35
Low achieving Chapter 3 sites	5	1.20	0.36	5	1.04	0.38	10	1.12	0.36

TABLE 8

1974-75 ACHIEVEMENT RESULTS (MONTH/MONTH GAIN)
BY BUILDING DESIGNATION FOR
HIGH ACHIEVING VS. LOW ACHIEVING SITES

	BUILDING 1 ONLY			BUILDING 2 ONLY			ALL STUDY BUILDINGS		
GROUPINGS OF SITES	N	MEAN	S.D	N	MEAN	S.D	N	MEAN	S.D
High Achieving Sites	21	1.83	0.43	21	1.58	0.69	42	1.71	0.58
Low Achieving Sites	20	1.06	0.39	20	1.06	0.30	40	1.06	0.35

A major difference in scope between last year's and this year's study effort was indicated earlier in this section -- the inclusion of two schools per site. Tables 7 and 8 show the difference in results on the average between the Building 1's and Building 2's for various groupings of sites. It is readily apparent from these data that the differences in achievement within sites (certainly within groups of sites) are much less than the differences between sites (or between groups of sites). Table 7 even indicates that for the low achieving Title I sites the nominally lowest achieving schools (Building 2's) averaged somewhat higher gains than did the nominally highest achieving schools (Building 1's) in those sites. Thus, the Building 1 (high)/Building 2 (low) designation does reflect 1974-75 reading achievement as it actually existed. In fact, viewing each of the six lines of Tables 7 and 8 as a possible test of whether any significant differences exist on the average between the Building 1 and Building 2 results from any given site, it is noteworthy that none of these six contrasts indicate any significant difference between buildings. While there was a significant difference between the reading achievement of school districts, there was not significant difference between the reading achievement of the pairs of schools within school districts.

With this result in mind, the possibility of using both buildings from any given site as a reflection of the overall success level of that site was investigated. The upper right hand figures of Table 8 show the result of combining the results from all Building 1's and all Building 2's at high achieving sites and using the combined results to represent the achievement of the successful study sites. The lower right hand figures show the similar results in the low achieving sites.

The 42 schools from the 21 high achieving sites averaged 1.71 month/month gain in compensatory education reading scores compared to 1.06 for the 40 schools from the 20 low achieving sites. As before where this contrast between high and low achieving sites nominally mirrored last year's results, the probability of observing this large a difference having the high achieving sites by chance is less than 0.00005. Thus, using all buildings for this basic contrast detracts not at all from the ability of the study to rely upon maximal achievement differences.

Finally, in order to assess the impact of relying upon all study buildings in a simple manner rather than keeping the Building 1/Building 2 designation when contrasting the achievement results of the Title I and Chapter 3 programs studied, Table 9 was produced. Neither of the contrasts formed between Building 1 and Building 2 results on each of the two lines of this table indicate significant differences in achievement according to the Building 1/Building 2 designation, paralleling the six previous contrasts which assessed this issue. Thus, the right hand column of Table 9 is the contrast between the Title I and Chapter 3 programs achievement results that become relevant in a study that will simply center on all study buildings rather than a more complex subscripted building reference. And once again, this Title I/Chapter 3 achievement result contrast shows no significant difference.

TABLE 9

1974-75 ACHIEVEMENT RESULTS
BY BUILDING DESIGNATION FOR
TITLE I VS. CHAPTER 3 SITES

GROUPINGS OF SITES	BUILDING 1 ONLY N	MEAN	S.D.	BUILDING 2 ONLY N	MEAN	S.D.	ALL STUDY BUILDINGS N	MEAN	S.D.
Title I Sites	29	1.43	0.62	29	1.35	0.60	58	1.39	0.61
Chapter 3 Sites	12	1.51	0.43	12	1.27	0.58	24	1.39	0.51

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SECTION VIII

COST ANALYSES FOR 1974-75 STUDY

In this section of the report, the cost analyses of the compensatory education reading programs in this year's sample are described. Before specific cost data are presented, the cost methodology used in the study will be discussed. This discussion will allow those readers unfamiliar with program cost analysis to better understand the results that follow. Following the discussion, four analyses, all under the overall heading of cost analysis, are presented. The first analysis deals with comparisons of total program costs between the high achieving and the low achieving programs and between Title I and Chapter 3 programs. The second analysis deals with the similar comparisons but uses five separate subtotals which make up the total program cost (subtotals that reflect the cost of specific activities comprising the overall program) as the basis for comparison. The third analysis deals again with similar comparisons but uses four other subtotals which also add to the total program cost (in this case the subtotals reflect the amount of resources from various funding sources that make up the total program cost) as the basis for comparison. The last of these analyses examines the relationship between total program cost (as well as each of the nine different cost subtotals alluded to above) and the month/month reading achievement gain.

Methodology

This study determined the cost of all resources devoted to reading instruction for compensatory education students for each school in the study. The phrase "cost of all resources devoted to reading instruction for compensatory education students" has a very specific meaning which the reader should clearly understand. An academic program, as viewed by

an individual student, may be considered as a set of resources all brought to bear upon a specific objective. For this study the objective deals with learning to read.

What are these resources? An obvious list of such resources might include books, audio visual equipment, consumable supplies, etc. At least as important, though somewhat less obvious, would be the following resources:

1) the time of teachers spent in the classroom actually providing the instruction;

2) the time of paraprofessionals in this same regard; and

3) the time of anyone else who actually has student contact for this instruction.

Even less obvious are the following resources which the student may or may not actually see but which are as surely devoted to this specific academic program as are the above items which involved student contact:

1) staff time spent in planning the instructional program;

2) staff time of these personnel spent in training for this program plus training materials or consultants;

3) staff time spent in making the decisions necessary for the operation of the program -- decisions on materials, classroom organization, training agendas, etc.; and

4) the time of administrators in the overall administrative activities necessary for the operation of the program.

Each of the resources listed above has a cost associated with it; books and materials have prices; consultants have fees; and personnel are paid salaries which incur fringe benefit costs. The problem can be viewed as one of first identifying how much of a given resource (e.g., how many books, how much time) is devoted to the program and then determining the cost of this amount of resources by using the "price" associated

with that resource. For instance, if ten percent of a principal's time is devoted to an activity specifically related to the compensatory education reading program, then ten percent of the salary and fringe benefit costs associated with that principal would be considered part of the total cost of the program. For ease of comparison between programs, the cost figure just arrived at could be divided by the number of students served in that building to obtain the cost per student for that resource.

Table 10 shows a format that can be used for summarizing this costing process when applied to any given compensatory education reading program. The first column lists the potential resources that could be allocated to a compensatory education reading program. The next five columns lists the activities (called "Functions" in Table 10) which comprise the overall program. The total amount of each resource allocated to each activity per student would be determined using a variety of cost data obtained from the district and school in question. A number of cells in Table 10 have been crossed out; these are cells which have no logical basis (e.g., consuming books and audiovisual software during administrative activities). Only the 34 resource/function cells not crossed out in this table would need to be filled in to obtain an estimate of the overall program cost per student (as well as function and resource subtotals). Appendix D explains this costing methodology in further detail.

The actual process of building the program cost models and performing the cost analysis reported here relied upon the COST-ED Model. This model was further adapted for use in this year's effort. Table 10 and Appendix C are all based directly upon this model.

TABLE 10

PROGRAM COST ANALYSIS STRUCTURE

DOLLARS PER COMP-ED STUDENT ANNUALLY — RESOURCES	FUNCTIONS: COMP-ED READING	COMP-ED PLANNING	COMP-ED TRAINING	COMP-ED DECISION MAKING	COMP-ED ADMINISTRATION	RESOURCE TOTAL	PERCENT OF TOTAL COST
PERSONNEL							
District Comp-Ed Director	X	11	17	24	30		
Principal	X	12	18	25	31		
Comp-Ed Teacher	1	13	19	26	X		
Regular Teacher	2	14	20	27	X		
Paraprofessional	3	15	21	28	X		
Other Staff	4	16	22	29	32		
CONSUMABLES							
Comp-Ed Books and AV Software	5	X	X	X	X		
Regular Books and AV Software	5	X	X	X	X		
EQUIPMENT							
Comp-Ed AV Equipment	7	X	X	X	X		
Other Comp-Ed Instructional Equipment	8	X	X	X	X		
Regular AV Equipment	9	X	X	X	X		
Other Instructional Equipment	10	X	X	X	X		
Comp-Ed Administration Equipment	X	X	X	X	33		
MISCELLANEOUS							
Miscellaneous Comp-Ed Training Expenses	X	X	23	X	X		
Miscellaneous Comp-Ed Administrative Expenses	X	X	X	X	34		
FUNCTION TOTAL							
PERCENT OF TOTAL COST							

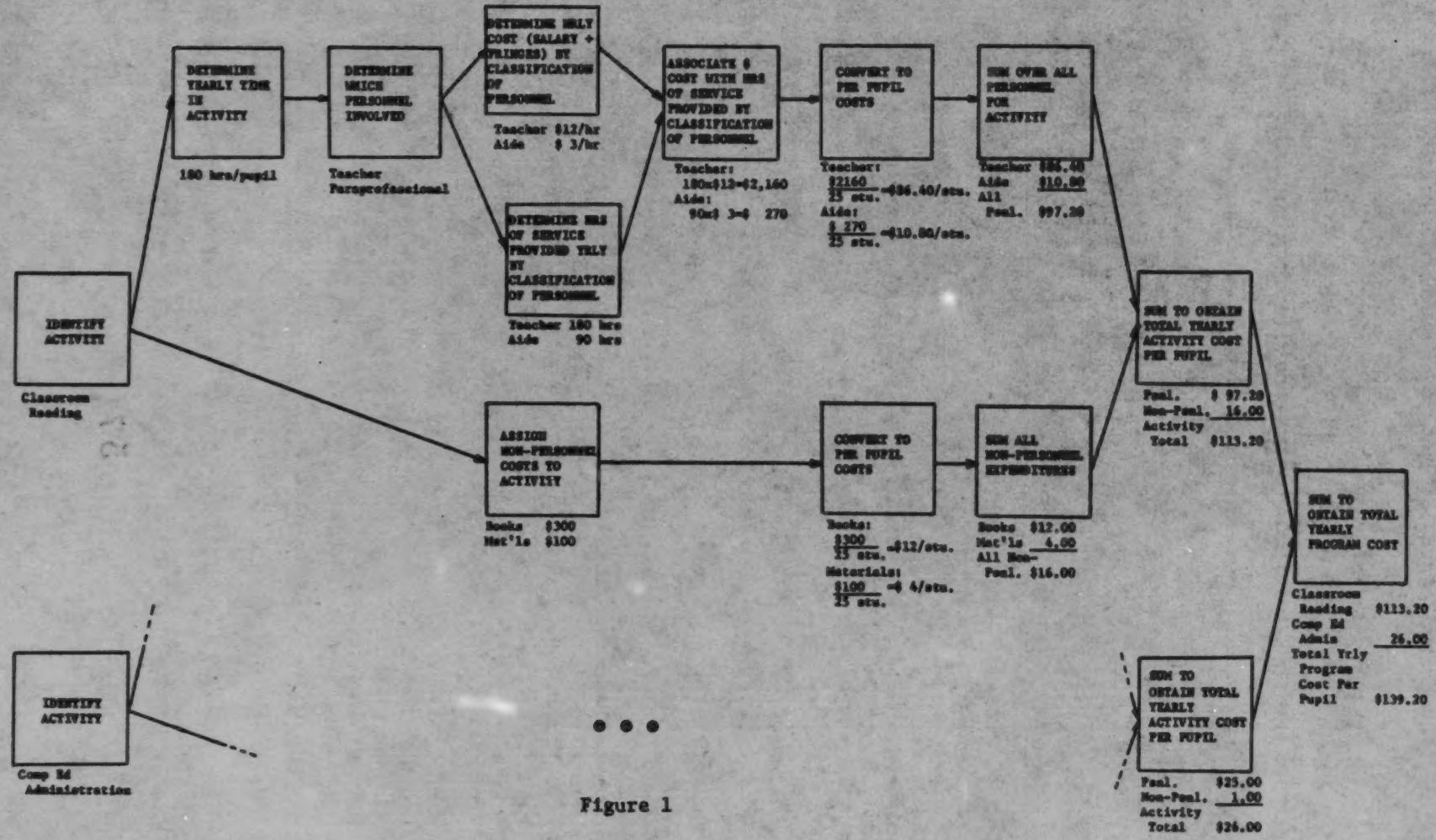

Figure 1

COSTING METHODOLOGY SCHEMATIC

The data used for building these cost models was obtained from a variety of sources. Local budgets, both general fund and compensatory education, were obtained from each site. Resource totals used in many of the 34 cells of Table 10 were obtained directly from these budgets combined with district and school compensatory education and total enrollment figures. Appendix C describes the budget analysis procedures followed for these data from each site. In all 48 sites the appropriate compensatory education budget for 1974-75 was obtained; and in 47 of the 48 sites the 1974-75 general fund budget was obtained.

Another major data source for this year's cost models was a salary listing obtained from each site for all personnel interviewed. These data included not only the total 1974-75 salary but also the specific contribution to that total from local sources, Title I funds, Chapter 3 funds, or other fund sources (such as the Section 43 state funded reading program). Salary data were obtained from 47 of the 48 sites for all personnel interviewed in the course of the on-site data collection effort. These data, coupled with the fringe rate data described in Appendix C, were used to establish a "price" for each staff time resource identified in the study as being allocated to the compensatory education program at that school or site.

These staff time allocation estimates were obtained in a number of ways. For the classroom reading activity, estimates were obtained from all teaching personnel interviewed as to the amount of time in the compensatory education setting, daily. Averages for these individual estimates were used for each program to determine the total hours of reading instruction received each year by each compensatory education student in that program. Further data from each of these same teaching personnel regarding their actual student contact time for compensatory education

reading allowed an average staff ratio during reading instruction to be obtained, which together with the "price" data described above produced the classroom reading portion of these resource costs.

For the time allocations not involving student time, each person interviewed provided estimates of the percent of their available time (i.e., working time not in contact with students) they devoted to the following activities:

1) planning for compensatory education reading and other programs;
2) training for such programs;
3) decision making related to such programs; and
4) administrative duties related to such programs.

Coupled with data on the actual amount of available working hours each year for that person, the total time devoted by that person to each of these activities was determined. Using this as a basis, the program total for this allocation was determined taking into consideration the total such persons serving the program being studied (e.g., if the average time devoted each year to planning for compensatory education reading was 25 hours per regular classroom teacher and 10 of the buildings 16 regular teachers served compensatory education students in their reading instruction, a total of 250 regular teacher hours was devoted to this activity yearly for that program). The cost of this total was then "priced" using the salary/fringe data described above and allocated to the number of compensatory education students served by that program in order to obtain further entries for Table 10.

Once all of the cost calculations for all resources in all activities (or functions) were completed, the COST-ED methodology produces a completed version of Table 10 for each compensatory education reading program modeled. A total of 92 such models were built; two sites

did not provide sufficient data to allow cost models to be constructed -- one due to a missing general fund budget, and one due to missing salary data -- for the four schools included in the study from these two sites.

Additionally, the salary data by fund source along with the budget documents allowed estimates to be made of the portion of each resource total included in the total program cost (the next to last column of Table 10) from each of these four funding sources: local general fund, Title I, Chapter 3, and other. These fund subtotals by resource were then summed over all resources to obtain an estimate of the amount from each of these fund sources reflected in the total program cost.

Before the cost results are presented, a few words of caution concerning their interpretation are in order. All costs shown are actual out of pocket costs to someone, either the local district's general fund, compensatory education monies, or some other source. There is no donated time prorated into the costs shown in these results. Also, the costs shown reflect the cost of all reading activities in which the compensatory education students were involved (both from the compensatory education teacher who likely has been paid from compensatory education monies and in the regular classroom from the regular teacher there) plus the cost of the paid-for time identified by each respondent in the four supportive staff areas. The costs shown may be higher than initial considerations of these programs would suggest; however, it should be kept in mind that when regular teachers say they spend 20% of their available time planning compensatory education activities, for instance, those staff hours are spread over the five or six compensatory education students served by that teacher, not over the total class of 26 to 28 students. With these guidelines in mind, the results of the cost analysis are presented below in the

four areas outlined at the outset of this section:

1) comparisons of total program costs between high achieving and low achieving programs and between Title I and Chapter 3 programs;

2) comparisons of costs of the specific five activities making up the total program cost;

3) comparisons of the contribution from each of four fund sources to the total program cost; and

4) an examination of the relationship between total program cost (as well as the nine subtotals above) to the month/month gain results of section VII.

Comparisons of Total Program Costs

For the 46 sites (92 schools) which were able to have cost models built for them, Table 11 shows the number of cost models, mean, and standard deviation for the total program cost for the following groups of sites:

1) high achieving Title I sites;

2) high achieving Chapter 3 sites;

3) low achieving Title I sites; and

4) low achieving Chapter 3 sites.

The cost figures reflected here are the total annual per pupil cost of the resources required for the compensatory education reading program of interest in a particular school. These figures are taken from the lower right hand cell of cost matrix (see Table 10) for that program. Other costs to be discussed in this section are subtotals of this total figure; all cost discussed in this section including the subtotals are annual per pupil costs.

In order to assess whether significant differences in total program costs exist in the 1974-75 study sample, Table 12 was produced by combining all high achieving groups of sites together and contrasting these costs

TABLE 11

1974-75 TOTAL PROGRAM COSTS (DOLLARS PER STUDENT ANNUALLY)
BY GROUPINGS OF SITES

GROUPINGS OF SITES	ALL STUDY BUILDINGS		
	N	MEAN	S.D.
High Achieving Title I Sites	36	697.6	380.9
High Achieving Chapter 3 Sites	14	474.1	146.4
Low Achieving Title I Sites	32	473.4	188.0
Low Achieving Chapter 3 Sites	10	412.4	136.1

TABLE 12

1974-75 TOTAL PROGRAM COSTS (DOLLARS PER STUDENT ANNUALLY)
HIGH ACHIEVING VS. LOW ACHIEVING SITES

GROUPINGS OF SITES	ALL STUDY BUILDINGS		
	N	MEAN	S.D.
High Achieving Sites	50	635.1	345.8
Low Achieving Sites	42	458.9	177.5

to those for all low achieving sites combined. A comparison of total program costs for high achieving sites and low achieving sites shows that the probability of obtaining the observed difference by chance is .002. In other words, the total program cost for high achieving sites was significantly greater than the total program cost for low achieving sites. As shown in Table 13, the 68 schools from the 34 Title I sites averaged $592.1 per student annually in total compensatory education reading program costs compared to $448.4 per student annually in the 24 schools from the 12 Chapter 3 sites. The probability of observing this large a cost differential in Title I sites over Chapter 3 sites by chance is 0.019. Thus, it may also be concluded that these two groups of programs were significantly different in terms of the cost of the resources required for their compensatory education reading programs during the study year.

TABLE 13

1974-75 TOTAL PROGRAM COSTS (DOLLARS PER STUDENT ANNUALLY)
TITLE I SITES VS. CHAPTER 3 SITES

	TOTAL PROGRAM COSTS		
	N	MEAN	S.D.
Title I Sites (68 schools)	34	592.1	323.8
Chapter 3 Sites (24 schools)	12	448.4	142.6

Comparisons of Costs of Specific Activities

Table 14 shows the cost results for each of five specific activities which make up the total compensatory education reading program. These activities were discussed in the methodology portion of this report and correspond to the first five column totals of Table 10 for each of the program cost models built. The results included in Table 14 are for the 46 sites (92 schools) for which cost data were available. Table 14 shows program costs by activity for the following:

1) high achieving Title I sites;

2) high achieving Chapter 3 sites;

3) low achieving Title I sites; and

4) low achieving Chapter 3 sites.

Adding the mean values shown in the first five columns of Table 14 yields the mean values shown in the sixth column (rounding may cause minor differences). The mean values shown in the sixth column are the same as those shown in Table 11.

In order to assess whether significant differences in the costs of specific activities exits in the 1974-75 study sample, Table 15 was produced by combining activity costs for all high achieving sites and contrasting these activity costs with those for all low achieving sites. The mean values shown in the first five columns of Table 15 add to the mean values shown in column six; these means in column six are the same as those shown in Table 12. All five of the contrasts in specific activity costs between these two groups of sites show the

TABLE 14

1974-75 SPECIFIC ACTIVITY COSTS (DOLLARS PER STUDENTS ANNUALLY)
FOR GROUPINGS OF SITES

GROUPINGS OF SITES	CLASSROOM READING ACTIVITIES		PLANNING FOR COMP ED READING		TRAINING FOR COMP ED READING		DECISION MAKING FOR COMP ED READING		ADMINISTRATIVE ACTIVITIES FOR COMP ED READING		ALL COMP ED READING ACTIVITIES
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN
High Achieving Title I Sites (n = 18)	324.3	176.4	170.6	117.3	34.4	37.2	116.4	116.0	52.0	54.6	697.6
High Achieving Chapter 3 Sites (n = 7)	259.7	123.6	113.4	56.7	23.4	17.0	63.3	37.0	14.4	6.7	474.1
Low Achieving Title I Sites (n = 16)	263.3	125.8	116.3	100.2	21.9	17.8	46.8	20.2	25.1	24.4	473.4
Low Achieving Chapter 3 Sites (n = 5)	257.9	116.6	74.1	41.1	19.2	15.9	30.2	13.3	31.0	42.1	412.4

TABLE 15

1974-75 SPECIFIC ACTIVITY COSTS (DOLLARS PER STUDENT ANNUALLY FOR HIGH ACHIEVING vs. LOW ACHIEVING SITES

GROUPINGS OF SITES	CLASSROOM READING ACTIVITIES		PLANNING FOR COMP ED READING		TRAINING FOR COMP ED READING		DECISION MAKING FOR COMP ED READING		ADMINISTRATIVE ACTIVITIES FOR COMP ED READING		ALL COMP ED READING ACTIVITIES
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN
High Achieving Sites (n = 25)	306.2	164.7	154.5	106.6	31.3	33.0	101.6	102.7	41.5	49.3	635.1
Low Achieving Sites (n = 21)	262.0	122.3	106.2	91.1	21.3	17.2	42.8	27.9	26.5	29.1	458.9
Probability of Observing a Cost Difference of this Size Favoring the High Achieving Sites by Chance	0.0777		0.012		0.040		0.0003		0.043		

high achieving sites being more costly than the low achieving sites; the bottom line of Table 15 shows four of these five contrasts to be significant at the 0.05 level or lower. Thus, for specific planning, training, decision making, and administrative activities related to the compensatory education reading program, the high achieving sites devoted significantly more resources than did the low achieving sites. For classroom (student contact) reading activities, the high achieving sites devoted more resources than did the low achieving sites; but the difference was not significant at the 0.05 level.

Following the analysis pattern used in the previous presentation of total program cost results, contrasts in specific activity costs between Title I and Chapter 3 programs were considered next. Table 16 was produced by combining all Title I sites and contrasting the activity costs for these sites with those for all Chapter 3 sites combined. The mean values shown in the first five columns of Table 16 add to the mean values shown in column six (within the reporting limitations of rounding); the means in column six are the same as those shown in Table 13. All five of the contrasts in specific activity costs between these two groups of sites show the Title I sites being more costly than the Chapter 3 sites; the bottom line of Table 16 shows three of these five contrasts to be significant at the 0.05 level or lower. Thus, for specific planning, decision making, and administrative activities related to the compensatory education reading programs, the Title I sites devoted significantly more resources than did the Chapter 3 sites. For classroom (student

TABLE 16

1974-75 SPECIFIC ACTIVITY COSTS (DOLLARS PER STUDENT ANNUALLY)
FOR
TITLE I SITES vs. CHAPTER 3 SITES

GROUPINGS OF SITES	CLASSROOM READING ACTIVITIES		PLANNING FOR COMP ED READING		TRAINING FOR COMP ED READING		DECISION MAKING FOR COMP ED READING		ADMINISTRATIVE ACTIVITIES FOR COMP ED READING		ALL COMP ED READING ACTIVITIES
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN
Title I Sites (n - 34)	295.6	156.5	145.0	112.2	28.5	30.2	83.7	93.1	39.3	44.9	592.1
Chapter 3 Sites (n = 12)	259.0	118.2	97.0	53.6	21.6	16.3	49.5	33.5	21.3	28.1	448.4
Probability of Observing a Cost Difference of this Size Favoring the Title I Sites by Chance		0.150		0.024		0.145		0.042		0.035	

contact) reading activities and training activities related to the compensatory education reading program, the Title I sites devoted more resources than did the Chapter 3 sites; but these differences were not significant at the 0.05 level.

Comparisons of Costs Provided From Various Funding Sources

Table 17 shows the portion of total compensatory education reading program costs provided from each of four funding sources. These funding sources are local general fund monies, Title I funds, Chapter 3 funds, and other fund sources (mostly the state funded Section 43 reading program). The results included in this table are for the same 46 sites (92 schools) whose program cost models have been discussed before in this section. Table 17 shows the cost results from all study buildings for the groupings of:

1) high achieving Title I sites;

2) high achieving Chapter 3 sites;

3) low achieving Title I sites; and

4) low achieving Chapter 3 sites.

Adding the mean values shown in the first four columns of Table 17 yield the mean values shown in the fifth column. The mean values shown in the fifth column are the same as those shown in Table 11.

In order to assess whether significant differences in costs provided from various funding sources exist in the 1974-75 study sample, Table 18 was produced by combining all high achieving groups of sites and contrasting these costs from various funding sources with those for all low achieving sites combined. The mean values shown in the first four columns of Table 18 add to the mean values shown in column five. Three of the four fund categories considered in this table show the

TABLE 17

1974-75 COSTS PROVIDED FROM VARIOUS FUNDING SOURCES
(DOLLARS PER STUDENT ANNUALLY)
FOR GROUPINGS OF SITES

GROUPINGS OF SITES	LOCAL GENERAL FUNDS		TITLE I FUNDS		CHAPTER 3 FUNDS		OTHER FUND SOURCES		TOTAL PROGRAM COSTS
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN
High Achieving Title I Sites (n = 18)	376.5	213.7	275.6	207.7	4.6	17.8	41.0	88.9	697.6
High Achieving Chapter 3 Sites (n = 7)	299.7	138.1	87.6	106.0	84.1	44.1	2.7	5.7	474.1
Low Achieving Title I Sites (n = 16)	288.1	129.9	168.6	124.4	13.8	29.6	3.0	7.3	473.4
Low Achieving Chapter 3 Sites (n = 5)	241.2	61.3	59.8	114.7	108.2	104.8	3.2	9.4	412.4

TABLE 18

1974-75 COSTS PROVIDED FROM VARIOUS FUNDING SOURCES
(DOLLARS PER STUDENT ANNUALLY)
FOR HIGH ACHIEVING vs. LOW ACHIEVING SITES

GROUPINGS OF SITES	LOCAL GENERAL FUNDS		TITLE I FUNDS		CHAPTER 3 FUNDS		OTHER FUND SOURCES		TOTAL PROGRAM COSTS
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN
High Achieving Sites (n = 50)	355.0	197.2	223.0	202.7	26.8	45.3	30.3	77.2	635.1
Low Achieving Sites (n = 42)	276.9	118.3	142.7	129.6	36.3	68.8	3.0	7.7	458.9
Probability of Observing a Cost Difference of This Magnitude by Chance	0.014*		0.015*		0.434*		0.013*		

*Where the cost difference favored the high achieving sites.

high achieving sites have significantly (at the 0.05 level) larger amounts of program costs provided from these funds than is the case in the low achieving sites. Only the costs provided from Chapter 3 funds show no difference between the high and low achieving sites. Actually more Chapter 3 funds are allocated to the compensatory reading programs in low achieving sites in the study sample though the difference is not statistically significant.

The results shown in this table -- that high achieving compensatory education programs receive significantly higher allocations of general funds, Title I funds, and funds from other fund sources (other than Chapter 3 funds) are especially interesting in light of the analysis previously presented. In that previous analysis it was pointed out that the total general fund expenditures per student annually in the high achieving sites, while somewhat greater than those in low achieving sites, were not significantly different from those in low achieving sites. Yet, at the program level, the analysis presented indicated that within this overall funding context, where no significant differences were found, significantly more local general funds were allocated to the compensatory education reading program in the high achieving sites than in the low achieving sites. These two results are important for they indicate that different allocation patterns within a general context of equal total funding may produce differential program results; i.e., more important than how much money is spent overall is the actual amount allocated to a specific program. The data for each of the two years of this study indicate that where significantly more resources are allocated to a specific program (in this case compensatory education reading), districts having approximately equal background levels of funding, significantly greater achievement in

reading for compensatory education students are also observed.

Other results from Section VI are also of interest here in the same regard. Section VI indicated that slightly, though not significantly, less compensatory education funds were available per student in the high achieving sites compared to the low achieving sites. Table 18 indicates that, similar to the discussion of general fund allocation above, within this overall compensatory education funding context, high achieving sites targeted more of their compensatory education funds specifically to the reading area. Again, this result indicates that if improving compensatory education reading is a goal, then greater total allocation will not guarantee the desired result. The results of this study indicate that it is the actual amount of resources allocated to the specific program in question that is associated with student success.

The results shown in Table 18 regarding "other" funding sources is explained as follows. Most of these other funds were from the state funded Section 43 reading program. These funds are available to Title I eligible schools which do not receive Chapter 3 funds. Thus, the increased level of allocation of these funds in the high achieving sites mirrors the decreased allocation of Chapter 3 funds just described.

Relationship Between Program Costs and Observed 1974-75 Achievement Scores

The cost analysis presented so far in this section dealing with high achieving vs. low achieving groups of programs were based on program success designations reflecting 1973-74 achievement data for these programs. Section VII demonstrated that these groupings of sites based on selection designation (high vs. low achieving) indeed resulted in groupings of sites that differed significantly in compensatory education

reading achievement during the 1974-75 school year. Thus, this selection designation has meaning and provides a proper basis for comparing costs (as well as other factors to be described in the next section on the effectiveness analysis).

However, another possible way of examining the relationship between program cost in 1974-75 and program success in 1974-75 is to directly explore the relationship between the two. Program cost results for 92 of the 96 programs studied have just been presented and analyzed in some detail. In Section VII program achievement results for 82 of the 96 study programs were also presented and analyzed. Considering only those programs for which both cost results and achievement results were available for the 1974-75 school year, a total of 80 programs provided such data. Two of the 82 programs providing achievement results were among the 4 programs for which no cost model could be built.

Figure 1 is a scatter diagram of the achievement results (vertical axis) and program cost results (horizontal axis) for these 80 programs. Note the legend showing the four groupings of programs reflected in this figure:

1) high achieving Title I sites; ○
2) high achieving Chapter 3 sites; □
3) low achieving Title I sites; and ●
4) low achieving Chapter 3 sites. ■

Also shown in Figure 1 is the least squares regression line which best fits these 80 points. This line, for the 1974-75 study, is shown as a solid line. The dotted line shown on this figure represents the regression line which best fitsthe 48 data points available from last year's study. The equations for these two regression lines are as follows:

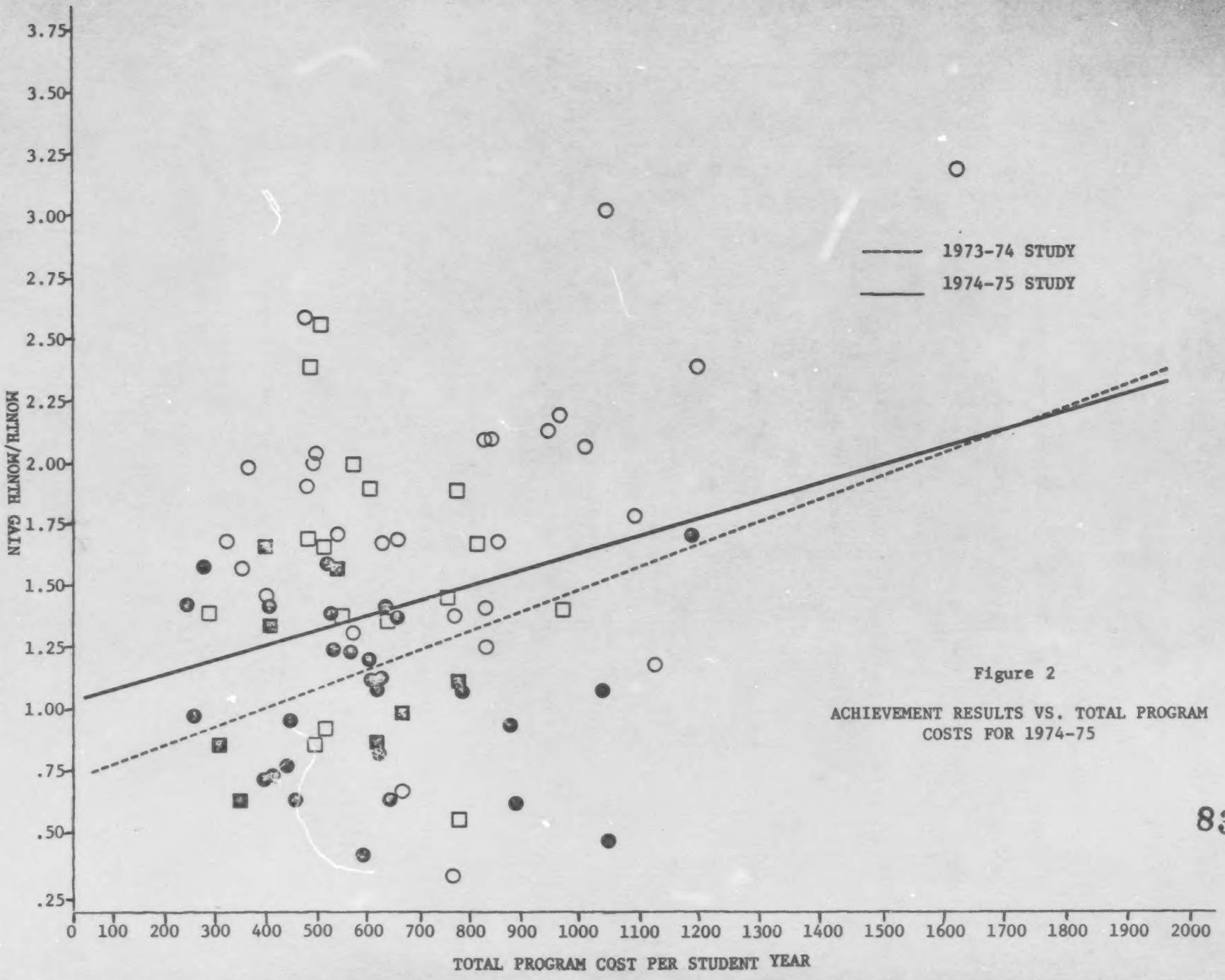

Figure 2

ACHIEVEMENT RESULTS VS. TOTAL PROGRAM COSTS FOR 1974-75

1974-75

month/month gain = 1.0016 + 0.000774 (total program cost)
(r = 0.2913; regression coefficient is significant at the 0.004 level)

1973-74

month/month gain = 0.697 + 0.000941 (total program cost)
(r = 0.5514; regression is significant at the 0.00005 level).

Thus, it can be seen that while the slope of this year's regression line is not as steep as last years, a significant relationship between month/month gain and total program cost exists in this year's data paralleling a major finding of last year's study effort. Further, there is not significant difference between the slopes of the two regression lines shown in this figure, though this year's line is somewhat less steep. Considering the results of the two years' studies, total program cost as one measure by itself explained 8.5% of the observed variation in month/month gain during the 1974-75 study and 30.4% of the observed variation in month/month gain during the previous year's study.

As a further analysis, the relationships between each of the 9 major subtotals of total program cost discussed earlier in this section and month/month gain were also investigated. Table 19 shows the Pearson correlation coefficient between each of these cost subtotals and compensatory education reading achievement for the 1974-75 data. The correlation result for total program costs has been included in this figure as well as for reference purposes. Three of the five cost subtotals dealing with specific activities show a significant positive correlation with program achievement results: classroom reading activities, planning, and decision making. Note that decision making shows the highest correlation of these three activities but that none of the correlation coefficients for these specific activity cost subtotals

TABLE 19

CORRELATIONS BETWEEN MAJOR COST SUBTOTALS

AND

MONTH/MONTH GAIN ACHIEVEMENT RESULTS

FOR THE

1974-75 STUDY SAMPLE

COST SUBTOTAL	r (between month/month gain and cost sub-total	r^2
Total Program Cost	+0.2913*	0.0848
Specific Activity Cost:		
Classroom Reading Activities	+0.2019*	0.0407
Planning for Comp Ed Reading	+0.2091*	0.0437
Training for Comp Ed Reading	+0.0795	0.0063
Decision Making for Comp Ed Reading	+0.2753**	0.0757
Administrative Activities for Comp Ed Reading	+0.1094	0.0119
Costs Provided from Various Funding Sources:		
Local General Fund	+0.0822	0.0067
Title I Funds	+0.3629**	0.1316
Chapter 3 Funds	-0.1000	0.0100
Other Fund Sources	+0.0703	0.0049

*Significant at the 0.05 level but not at the 0.01 level.
**Significant at the 0.01 level or lower.

is larger than the correlation for total program cost.

Only one of the four cost subtotals dealing with costs provided from various funding sources shows a significant positive correlation with program achievement results -- Title I funding allocation. Note that this particular correlation coefficient is larger than that for total program cost.

Also included in Table 19 are the values of r^2 for each r; these values, representing the proportion of total observed variations in month/month gain during the 1974-75 study year explained by the variations of the subtotal in question, are included for the convenience of the reader in assessing the meaning of specific correlational results.

SECTION IX

EFFECTIVENESS ANALYSES

In this section of the report, the results of the effectiveness analyses conducted using the 1974-75 achievement data are described. The purpose of these analyses was to identify those conditions, activities, or things (policy variables) which are related to student reading achievement. While the previous section indicated that the amount of resources allocated to reading instruction was related to student reading achievement, it was actually those conditions, activities, and things purchased by the resources that were related to the student reading achievement.

The effectiveness analyses can be separated into two general groups. The first group is used to determine which of the policy variables under investigation discriminated between the high and low achieving sites. The product of this first group of analyses is a set of variables which significantly discriminated between high and low sites. The second group of analyses is concerned with each of the individual variables that were identified by the first group of analyses. The various sites are divided into either: 1) two groups reflecting a high degree or a low degree of the policy variable being studied (in the case of quantitative variables) or 2) groups representing the various categories of the policy variable (in the case of qualitative variables). The reading achievement gains observed for these various groups were then examined to determine if reading achievement varied according to these groups. In this way, the data gathered during any given year of the Cost-Effectiveness Study was examined twice.

During the first year (1973-74) of the study, 45 policy variables were found to discriminate between high and low achieving sites. As stated earlier in this report, the high and low sites for this first year of the study were identified using 1972-73 reading achievement data. The second step of the first year analyses was to determine if the 45 identified variables were significantly related to the 1973-74 reading achievement gains at the .05 level. It was found that 17 of the 45 variables were significantly related to the 1973-74 reading achievement gains. In other words, the first year of the study identified 17 policy variables that were cross-validated over two years of reading achievement results.

The effectiveness analyses for the second year of the study (1974-75) were conducted in the same manner as in the first year of the study. There was one modification in the analysis plan for the second year. The pre-established significance level for the first year of the study was .05 for both sets of analyses. For the second year, the significance level for the first set of analyses, a general screening procedure, was initially set at .10 rather than .05.[4] The significance level for the second set of analyses remained at .05.

Cross-Validation of First Year Results

The first step of the second year analyses was to examine those variables which were found to be significant during the first year of the study. These variables included 12 variables that were found to be significant during both phases of the first year analyses. Also included in this analysis were those variables which were significantly related to achievement on the first phase of the first

[4]After the first phase analyses, the significance level was changed back to .05 because the number of variables significant at the .10 level became unmanageable.

year analyses but not on the second phase of the first year analyses. It was found that 5 of the 37 variables included in the analysis discriminated significantly between the high and low achieving sites (site selection based on 1973-74 achievement results). These variables are listed in Table 20.

The next step in the analysis was to examine the 683 new/modified variables (i.e., those variables not included in the first year of the study) to determine if they discriminated between the high and low sites. This analysis showed there were 120 variables which discriminated between high and low sites at the .05 level or better. These variables are listed in Appendix A.

TABLE 20

EDUCATIONALLY SIGNIFICANT VARIABLES

Variable	Relationship to Reading Achievement
Principal (respondent)	
1. Number of teacher working hours at school daily	High number of hours was associated with high reading achievement
Compensatory Education Teacher (respondent)	
2. Fraction of materials selected by teacher	High fraction of materials selected was associated with high reading achievement
3. Days of training provided teachers at onset of project	Greater number of days was associated with high reading achievement
4. Did paraprofessionals help teacher	Except where paraprofessionals functioned as second teachers, assistance from paraprofessionals was associated with low reading achievement
5. Teacher morale	High teacher morale was associated with high reading achievement

The next step in the analysis was a phase two analysis for the second year; this analysis attempted to find out if groups based upon the variables that were significantly related to achievement in previous analyses were different in terms of 1974-75 reading achievement scores. Of these 120 variables, it was found that 36 were significantly related to the 1974-75 reading achievement scores. These variables were then examined (using non-statistical methods) to determine if there were any interelationships within them. It was found that there were five groups of variables that were dealing with this same concept or topic. Those groups are listed in Table 21.

TABLE 21

CATEGORIES OF VARIABLES
RELATED TO READING ACHIEVEMENT

Category	Relationship to Reading Achievement
Degree to which accountability was implemented	High degree of implementation was associated with high reading achievement
Extent of paraprofessional involvement	High level of involvement was associated with low reading achievement
Involvement of private firms other than selling materials	Private firm involvement was associated with low reading achievement
Degree of program organization	High degree of program organization was associated with high reading achievement
Professional staff involvement	(A single relationship characterizing this group of variables has not been identified)

For those variables that were included in the first year of the study, it was possible that they would be included in four separate analyses: phase one and two for both year one and two. The question arose, how many analyses would be necessary for a variable to be significantly related to reading achievement before it could be said that it was an important variable with respect to reading achievement? Certainly, a variable which was significantly related to achievement of all four variables could be considered important. But would a variable which showed significant relationship only two of the four times be considered important? What about a variable which was related three times? These questions can be summarized into one question, what is the power of the statistic used to identify their relationship? Most statistic tests are performed in such a way to give a probability statement as to the chances of finding significance when no real significance exists. The power of a test deals with the probability of not finding significant relationship when such a relationship does exist. Since the t-test was used more than any other given statistic and means of calculating its power is readily available, it was decided to examine the power of the t-test given the population scores with which the study deals. It was found that the power of most of the t-tests, for the .05 level, range from approximately .6 to .7 with few examples going above .75. These figures had an average of approximately .67 or 2/3.

The implication of this result is that it could be expected that if a true relationship existed between some variable and achievement, the typical t-test used in the study would detect that relationship only two out of three times. It was decided at that point to include as educationally significant variables any variable which was found to be related to achieve-

ment three out of four analyses. This is a conservative choice in that three out of four is above the two out of three ratio established above.

TABLE 22

VARIABLES RELATED TO READING ACHIEVEMENT ON THREE OF FOUR ANALYSES DURING 1973-74 AND 1974-75 STUDY YEARS

Variable	Relationship to Reading Achievement
Principal (respondent)	
1. Number of teacher working hours at school daily	High number of hours was associated with high reading achievement
2. Principal's satisfaction with regular teacher's coordination, of reading services, with compensatory education reading services	High level of satisfaction was associated with high reading achievement
Compensatory Education Teacher (respondent)	
3. Fraction of materials selected by teacher	High fraction of materials selected was associated with high reading achievement
4. Days of training provided teachers at onset of project	Greater number of days was associated with high reading achievement
5. Did paraprofessionals help teacher	Except where paraprofessionals functioned as second teachers, assistance from paraprofessionals was associated with low reading achievement
6. Teacher morale*	High teacher morale was associated with high reading achievement

Those variables included in both years of the study were examined so as to determine how many times they were shown to be significantly related to reading achievement. Those variables which were significantly related to achievement at least on three of the four analyses are included in Table 22.

It should be noted at this point that only one variable was related to achievement on all four analyses; that variable is noted with an asterisk in the Table.

Tables 21 and 22 contain 11 variables or groups of variables which have been found over one or both years of the study to be significantly related to reading achievement. The remainder of the effectiveness analysis is concerned only with these 11 variables or groups of variables. The number of variables considered was actually reduced to seven. The group of variables representing professional staff involvement was dropped because no single measure characterizing this group of variables has been identified; continuing analyses will address this problem. A group of variables concerning the extent of paraprofessional involvement was dropped in favor of the variable in Table 20 representing the nature of paraprofessional involvement. Finally, the variables, in Table 20, pertaining to the number of hours teachers spend at school daily and the fraction of materials selected by the compensatory education teacher were dropped. These variables were dropped because they were not significantly related to reading achievement on the fourth and last of the analyses. The data, primarily correlation coefficients, for the remainder of the effectiveness analyses was obtained from the fourth series of analyses. Without a significant correlation between these variables and reading achievement it was decided not to use them in the analysis.

Thus, the final set of analyses was performed on eight variables including reading achievement gains. These variables and their correlations are shown in Table 23.

TABLE 23

INTERCORRELATION MATRIX FOR VARIABLES
INCLUDED PATH ANALYSES

Variable	Variable Number	Variable Number						
		2	3	4	5	6	7	8
Days training*	1	-.17	-.19	-.05	.00	.07	.11	.21
Paraprofessional** Involvement	2		-.12	-.17	.12	-.08	-.04	.20
Teacher Morale	3			.18	.12	.42	.24	.28
Private Involvement	4				-.31	-.20	.03	-.18
Degree of Accountability	5					.35	.00	.24
Degree of Program Organization	6						.10	.22
Principal Satisfaction with Teacher Coordination	7							.31
Reading Achievement	8							

* See Tables 21 and 22 for more detailed descriptions of variables.

** The varying degrees of paraprofessional involvement were assigned numerical values as follows:

Only non-instructional support, no direct student contact	2
Mostly non-instructional support, some direct student contact	3
Some non-instructional support, mostly student instructional activities	4
Mostly instruction, some planning, little non-instructional support	5
Function almost as a second teacher	6
No compensatory education paraprofessionals involved	7

Based on previous analyses, it is known that the variables in Table 23 are related to reading achievement. However, the previous analyses do not provide an indication of how those variables are related to reading achievement and to each other. To determine the nature of these relationships, it was decided to use path analysis as described in Multiple Regression and Behavioral Research, Kerlinger and Pedhazur. It should be noted at this point that path analysis is not a means of identifying causes but a means of determining which of various proposed explanations of reality best fit the data at hand. Path analysis could yield different results with a different set of data. Path analysis does assist the researcher in determining which of various explanations best fit the available data.

The path model shown in Figure 3 was developed from the correlations shown in Table 23. It was the first path model for which a complete path analysis was calculated. Notice that the arrows between the various boxes represent the hypothesized directions of the relationships between the variables. For example, the arrow between variable 3, teacher morale, and variable 8, student achievement, indicates that it was hypothesized that teacher morale affected student achievement. The correlation between teacher morale and student achievement was .28. This is shown along side the arrow connecting those two variables. The figure in the parentheses below the correlation of .28 is the reproduced correlation. The degree to which the hypothesized path model reflects the reality of the data at hand is shown by the agreement between the correlation and the reproduced correlation in the parentheses. For certain relationships between the variables, the path coefficient (and subsequently the produced correlation) was not calculated. For example, no path coefficient was calculated for the relationship between variable 4, presence of private firms, and variable 5, degree of implementation of accountability. Where

only one variable is hypothesized to affect another variable (only variable 4 was hypothesized to affect variable 5), the correlation between the two variables is identical to the path coefficient between the two variables.

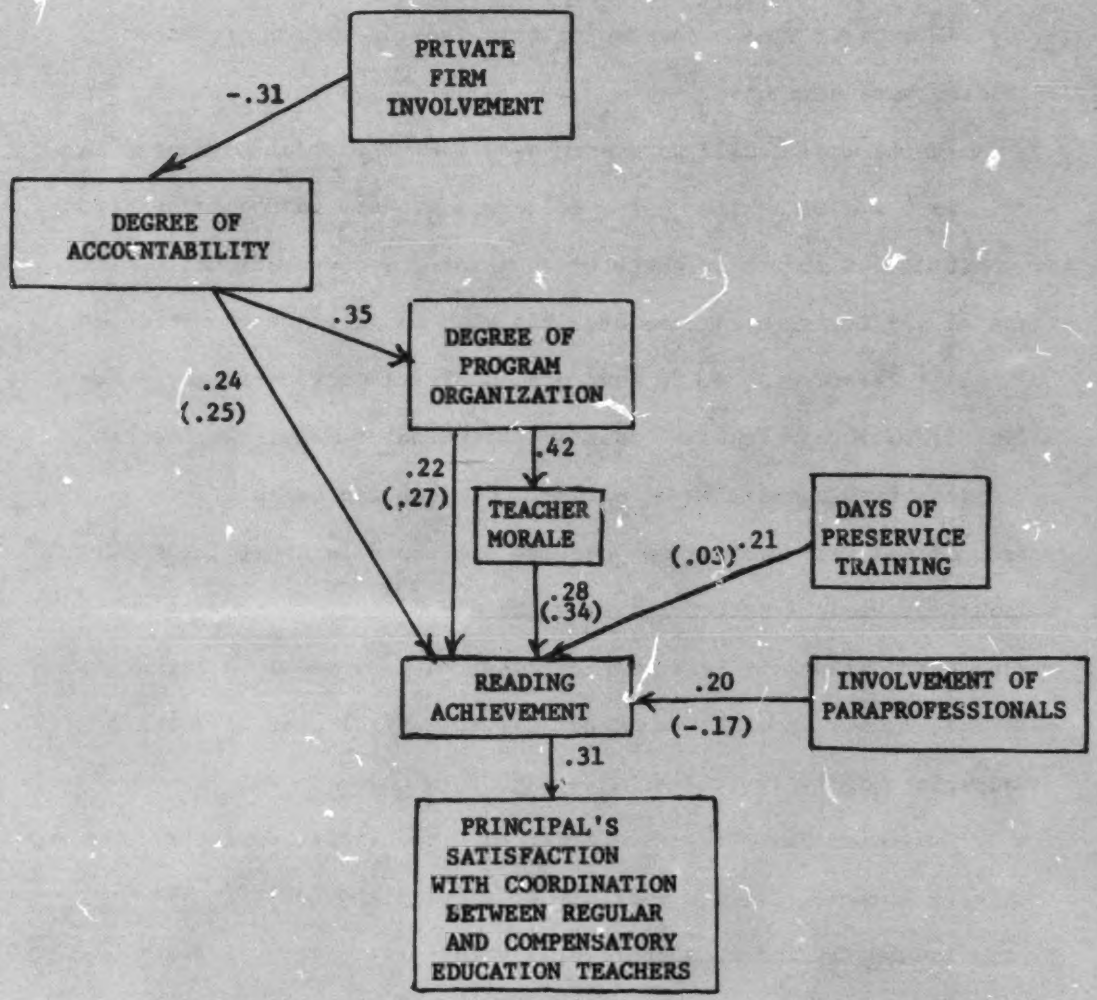

Figure 3

Path Analysis Model 5A

Model 5A, shown in Figure 3, shows that the agreement between the correlation and reproduced correlation between the variable of teacher morale, paraprofessional, and pre-service training, and the variable achievement were not high. This disagreemtn between the correlation and the reproduced correlation indicates that Model 5A is not a good representation of reality as represented by the data at hand. Because of this lack of agreement, other models were developed.

While many models were examined, the next model presented in Figure 4 showed a high degree of agreement between the correlation coefficients and their respective reproduced correlations. While Model 12 did represent the best fit with the data at the point in time it was developed, further path analyses were performed. Model 14 in Figure 5 represents a minor modification of Model 12. As can be seen from the degree of agreemtn between the correlations and reproduced correlations in Model 14 and those in Model 12, Model 12 does represent a better fit with the data at hand than does Model 14. Because Model 12 is less complex than Model 14 and is a better fit with the data at hand than Model 14, it was selected as being a superior model.

At this point, it was decided that Model 12, presented in Figure 4, represented a sufficiently accurate model of reality as represented by the data available.[5] This is not to say that further analyses would not find a model which would better fit the data. Moreover, it is now a challenge to demonstrate, through systematic analysis, that there is another model which better fits reality.

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[5]Fifteen path models were analyzed. Models 5A and 14 were the most complex models considered.

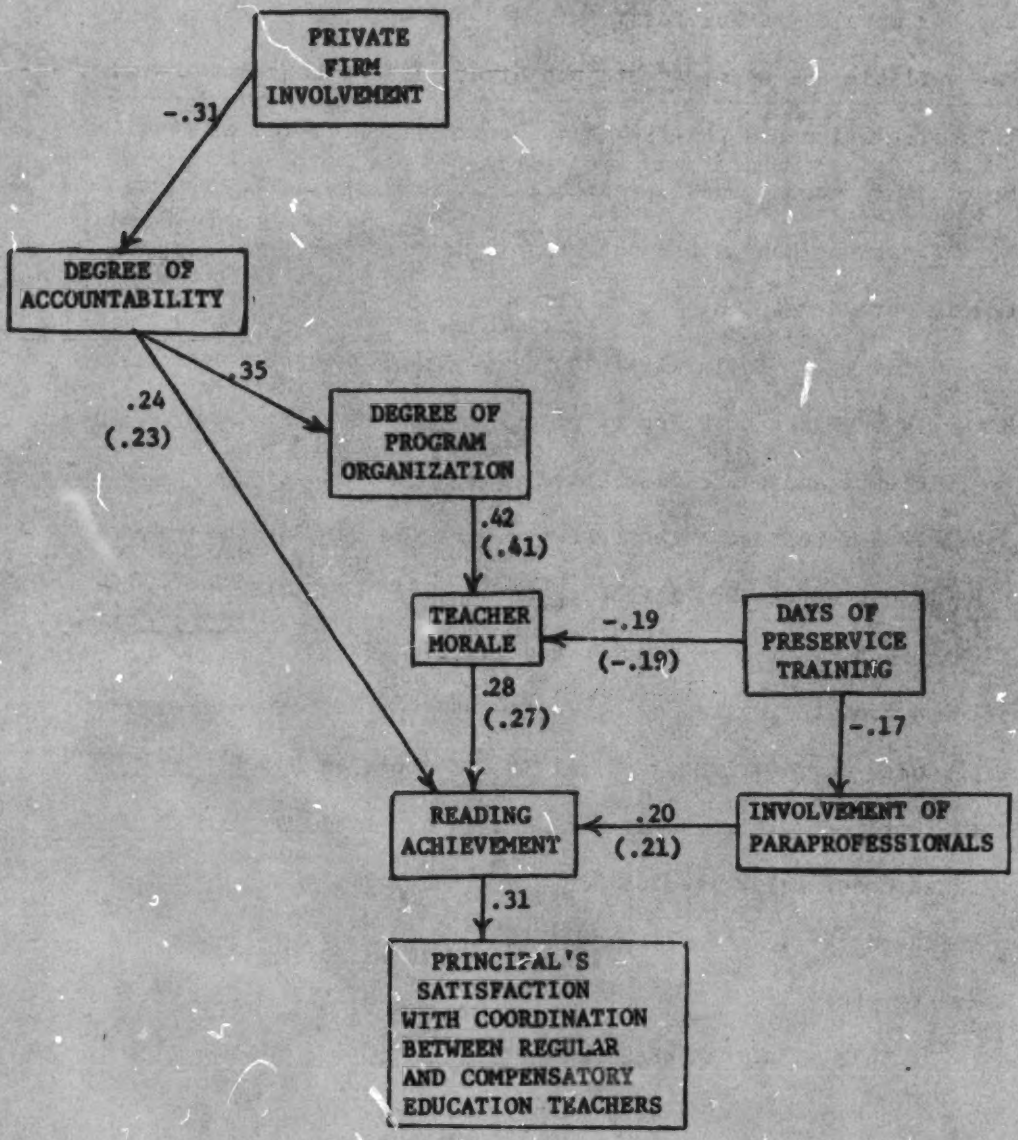

Figure 4

Path Analysis Model 12

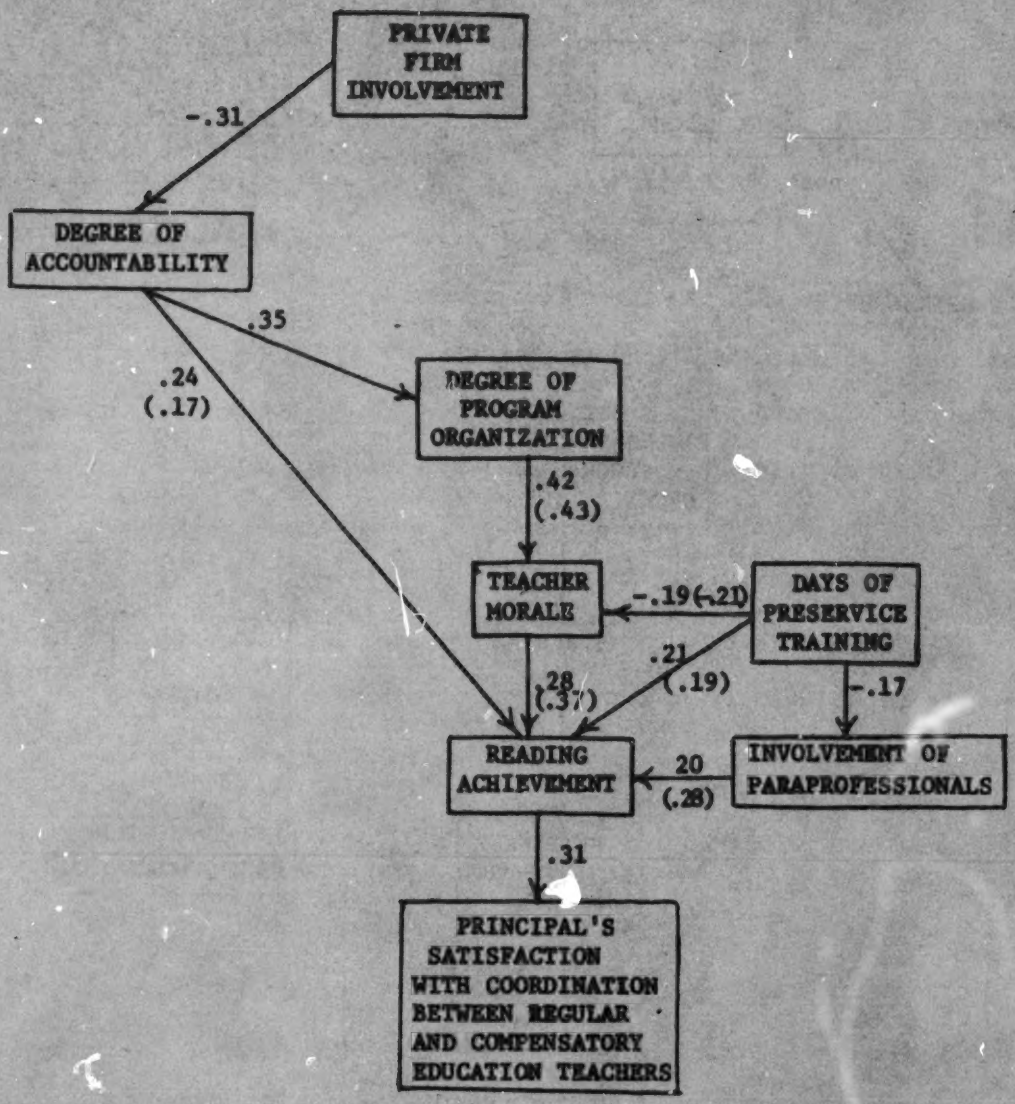

Figure 5

Path Analysis Model 14

SECTION X

SUMMARY, CONCLUSIONS, AND RECOMMENDATION

Summary

The purpose of this report is to provide a description of the 1974-75 Michigan Cost-Effectiveness Study and its findings. As was the case with the first year of the study, 1973-74, the 1974-75 study was restricted to compensatory education reading programs. The study was an effort to develop and implement evaluation techniques which can determine what educational practices bring about changes in student behavior and what costs are associated with those practices.

The Cost-Effectiveness Study has focused upon educational variables which could be changed or controlled by educational systems. Variables such as race, social economic status, level of parental education, and so forth, which cannot be readily controlled or modified by an educational system were not examined. It was the intent of the study to examine those aspects of educational policy and practices which could be changed to bring about a higher quality of education for students.

The design implemented for the first year of the Cost-Effectiveness Study consisted of two components. An effectiveness component was developed and integrated into the cost component derived from the COST-ED model. The criterion for measuring effectiveness was grade equivalent gains measured on a month per month in program basis using standardized norm-referenced tests administered by participating districts. Process variables were used as independent variables and, through various analytical

techniques, were contrasted between successful and unsuccessful programs to determine if any significant relationship existed. The COST-ED model was modified and used to determine the costs associated with variables and practices significantly related to program success. The above design features were implemented during the 1973-74 school year.

Anticipating the availability of funds for the study during school year 1973-74, an initial effort was conducted in the spring of 1973 to develop and field test data collection instruments in twelve sites. The resulting instruments, refined after field testing, were structured in nature and were different for each of the five respondent types, which included the director of compensatory education, the principal of the study school, compensatory education reading teachers, regular classroom teachers, and others such as paraprofessionals involved in the program. Data collection for the 1973-74 study was conducted over a two month period ending in April 1974.

In conducting the effectiveness analysis, approximately 450 items were included in the analysis to determine relationships with program success. Simple discriminant techniques were used to identify those variables showing significant contrasts between high achieving and low achieving sites. The use of more complex types of analysis was limited due to missing data. While some exploratory attempts were made to determine quasi-causal relationships, it was decided that this type of analysis could be conducted most appropriately during the 1974-75 phase of the study.

The cost analysis included the development of cost models for each of the forty-eight compensatory education programs. Each

program was modeled to include one activity in which the student was involved (classroom reading) and four supportive activities not involving student's time directly (planning, training, decision making and administration). The specific methodology for identifying and allocating cost is described in detail in Section VIII. It is important to note that the cost data gathered included all resources allocated to the program in question rather than just those contributed by Chapter 3 and/or ESEA Title I.

The overall purpose of the 1974-75 study was the continued development of the analytical techniques reflected in the cost-effectiveness model. However, a critical part of this continued development was considered to be a cross-validation effort focusing upon the variables identified and reported in the executive summary of the 1973-74 study. The importance of cross-validation rests in the need for evidence upon which to anchor the overall findings, evidence that involves the demonstration of significant results over more than one year of the study.

Following, in importance, the cross-validation of the reported results of last year's effort is the identification of new variables which relate to achievement. Appendix A lists those variables.

The third and last purpose of the 1974-75 effort was the investigation of the direction of the relationships between achievement and various identified variables. Time constraints and the volume of data, with the concommitant data management needs, prevented all of the possible analyses from being completed. However, the development of the path models presented in Section IX do represent a major step in identifying the nature of the significant relationships between various variables and reading achievement.

For the 1974-75 study year, a number of changes in the overall study design were carried out. Two buildings per study site were included in the sample, both the highest and lowest achieving buildings from each district (site) regardless of whether the district was selected as a high or low achieving site. This basic change, from 1973-74, in the design was carried out in order to investigate within school district variables. Because of this change in design, districts having only one elementary school were included in the study. Thus, the study sample for the 1974-75 study year tended to include districts which on the average were larger than the previous year's study sample.

Following the overall dimensions intended for the 1973-74 study, the site selection process resulted in identifying 25 districts in Michigan highly successful in their compensatory education reading programs and 25 that were highly unsuccessful. Thirty six of these 50 districts were to be included for their Title I programs; fourteen for their Chapter 3 programs.

Initially, both the Title I and Chapter 3 pools of sites were deliberately selected as being double the size needed so as to allow for replacement of sites which did not meet the following criteria:

1) the compensatory education program (Title I or Chapter 3) was in existence by the fall of 1973;

2) the program had the same key persons (e.g., reading coordinator) as in 1973-74; or the same key persons provide the same services to the program as were provided the previous year, even though these persons may hold different titles or be in different locations;

3) the school building had the same principal as in 1973-74;

4) teacher turnover in the building was less than 40 percent;

5) there were at least five compensatory education students per participating grade level; and

6) the materials used were essentially those used in the previous school year.

Problems of program stability in the low achieving sites, similar to those encountered last year, prevented the desired 50 sites from being identified and included in the current year's study. A total of 96 schools from 48 sites were selected including 36 schools from 18 high achieving Title I sites, 36 from 18 low achieving Title I sites, 14 from 7 high achieving Chapter 3 sites, and 10 from 5 low achieving Chapter 3 sites.

Education Turnkey Systems, Inc.'s field data team for the 1974-75 study included six members. The project's data coordinator and four of the six data collectors performed the same function during the 1973-74 study. Thus, the 1974-75 data team matched that of the 1973-74 team. However, the data team was retrained at the start of the 1974-75 study.

Data collection took place between March and June of 1975. The procedures followed paralleled those of the 1973-74 effort with a site initially contacted by mail followed by a telephone contact made by the data coordinator. These initial mail and phone contacts were for the purpose of selection, verification of selection information, and scheduling of the on-site visit. Once both buildings for a site had been identified and scheduled for a visit, letters were sent to the district's director of compensatory education and the principals of each study school confirming these arrangements and alerting these persons to data needs that they might more easily fulfill prior to the on-site visit. These needs were expressed as specific requests for enrollment data, roster of compensatory education students, and budget documents. The typical site visit included interviews with one director,

two principals, two compensatory education teachers, six to eight regular classroom teachers, three or four paraprofessionals, plus one other staff for a total of 16-17 such interviews.

Because the results of the 1973-74 study were made public prior to the 1974-75 on-site visits, it was felt that some measure should be taken to determine the impact of this release on the level of awareness of the study on the part of all persons interviewed this year. The measure chosen was a simple question asked of each of the 808 respondents included in this year's study: "Are you familiar with the results of the first year of this study which were recently released?" The percent of respondents answering yes to this question is shown below for each type of respondent:

1) district directors of compensatory education (48 respondents) -- 15% said yes;

2) principals (96 respondents) -- 6% said yes;

3) compensatory education teachers (87 respondents) -- 5% said yes;

4) regular classroom teachers (356 respondents) -- 2% said yes;

5) paraprofessionals (184 respondents) -- 2% said yes; and

6) other staff (37 respondents) -- 5% said yes.

It was concluded from the above results that, below the level of district director of compensatory education, the study was not widely known, even after the public release of results and the publicity surrounding these results. Even at the directors' level it was not felt that the percent indicating awareness was high enough to cause concern over the issue of potential contamination of the 1974-75 results. This item, taken as a study variable, showed no significant contrasts between respondents from high and low achieving sites for any

of six types of respondents. This would indicate that no significant contamination occurred.

The following background characteristics were compared for successful and unsuccessful sites:

1) Median Family Income in District, Dollars Annually

2) Total General Fund Expenditure ($) per Student

3) Total Compensatory Education Expenditure ($) per Compensatory Education Student (Title I for Title I sites, Chapter 3 for Chapter 3 sites)

4) Number of Title I Students

5) Number of Chapter 3 Students

District Enrollment

6) Kindergarten

7) Grades 1-6

8) Grades 7-12

9) K-12

10) Number of Elementary Schools in the District

11) Number of Title I Elementary Schools

12) Number of Chapter 3 Elementary Schools

13) Number of Elementary Schools Which are Both Title I and Chapter 3

There were no significant differences between the two groups of sites on these characteristics.

A major difference in scope between the 1973-74 and 1974-75 study was the inclusion of two schools per site: one high achieving school and one low achieving school. It was found that the difference in achievement between sites was significant but that the comparison of all

high achieving schools (regardless of site designation) to all low achieving schools showed no significant difference in reading achievement. With this result in mind, buildings from high achieving sites were designated high achieving buildings and buildings from low achieving sites were designated low achieving buildings.

Four cost analyses were presented. The first analysis dealt with comparisons of total program costs between the high achieving and the low achieving programs and between Title I and Chapter 3 programs. The second analysis dealt with similar comparisons but used five separate subtotals which make up the total program cost (subtotals that reflect the cost of specific activities comprising the overall program) as the basis for comparison. The third analysis dealt again with similar comparisons but used four other subtotals which also add to the total program cost (in this case the subtotals reflect the amount of resources from various funding sources that make up the total program cost) as the basis for comparison. The last of the cost analyses examined the relationship between total program cost (as well as each of the nine different cost subtotals described above) and the month/month reading achievement gain.

This study determined the cost of all resources devoted to reading instruction for compensatory education students for each school in the study. The phrase "cost of all resources devoted to reading instruction for compensatory education students" has a very specific meaning which the reader should clearly understand. That meaning is that any cost incurred, by school district staff, performing the functions of a compensatory education reading program: 1) instruction, 2) planning, 3) training, 4) decision making, and 5) administration.

The data used for building the cost models was obtained from a variety of sources. Local budgets, both general fund and compensatory education, were obtained from each site. Another major data source for this year's cost models was a salary listing obtained from each site for all personnel interviewed. These data included not only the total 1974-75 salary but also the specific contribution to that total from local sources (such as the Section 43 state funded reading program).

Staff time allocation estimates were obtained in a number of ways. For the classroom reading activity, estimates were obtained from all teaching personnel interviewed as to the amount of time in the compensatory education setting, daily. Averages for these individual estimates were used for each program to determine the total hours of reading instruction received each year by each compensatory education student in that program. Further data from each of these same teaching personnel regarding their actual student contact time for compensatory education reading allowed an average staff ratio during reading instruction to be obtained, which together with the "price" data described above produced the classroom reading portion of these resource costs.

For the time allocations not involving student time, each person interviewed provided estimates of the percent of their available time (i.e., working time not in contact with students) they devoted to the following activities:

1) planning for compensatory education reading and other programs;

2) training for such programs;

3) decision making related to such programs; and

4) administrative duties related to such programs.

Coupled with data on the actual amount of available working hours each year for that person, the total time devoted by that person to each of these activities was determined. Using this as a basis, the program total for this allocation was determined taking into consideration the total such persons serving the program being studied.

A few words of caution concerning their interpretation are in order. All costs shown in this report are actual out of pocket costs to fund source, either the local district's general fund, compensatory education monies, or some other source. There is no donated time prorated into the costs shown in these results. Also, the costs reflect the cost of all reading activities in which the compensatory education students were involved.

A comparison of total program costs for high achieving sites and low achieving sites showed that the total program cost for high achieving sites was significantly greater than the total program cost for low achieving sites. The cost per student for high achieving sites was $635 as compared to $459 for the low achieving sites. Further analyses showed that the total annual per student cost for Title I sites was significantly larger than for Chapter 3 sites. The Title I cost per student was $592 while the cost per student for Chapter 3 was $448. The cost analyses showed that for the function of planning, training, decision making, and administrative activities related to the compensatory education reading program, the high achieving sites devoted significantly more resources than did the low achieving

sites. For classroom (student contact) reading activities, the high achieving sites devoted more resources than did the low achieving sites; but the difference was not statistically significant.

Comparing Title I and Chapter 3 sites, over the five functions, it was found that for specific planning, decision making, and administrative activities related to the compensatory education reading programs, the Title I sites devoted significantly more resources than did the Chapter 3 sites. For classroom (student contact) reading activities and training activities related to the compensatory education reading program, the Title I sites devoted more resources than did the Chapter 3 sites; but these differences were not statistically significant.

Three of the four fund sources examined showed high achieving sites allocated significantly larger dollar amounts per pupil than did low achieving sites. Only the costs provided from Chapter 3 funds show no difference between the high and low achieving sites. Actually more Chapter 3 funds were allocated to the compensatory reading programs in low achieving sites in the study sample though the difference is not statistically significant.

The cost analyses presented in the first three sets of analyses dealt with high achieving vs. low achieving groups of sites, based on program success designations reflecting 1973-74 achievement data for those sites. Comparing program costs to 1974-75 reading achievement resulted in finding that the following cost categories (in terms of annual per pupil cost) were significantly related to reading achievement:

1) Total Program Cost

2) Cost of Classroom Reading Activities

3) Cost of Planning for Compensatory Education Reading

4) Cost of Decision Making for Compensatory Education Reading

5) Title I Funds

In all five cases, higher costs were associated with high reading achievement.

The purpose of the effectiveness analyses was to identify those conditions, activities, or things (policy variables) which are related to student reading achievement. While the cost analyses indicated that the amount of resources allocated to reading instruction was related to student reading achievement, it was actually those conditions, activities, and things purchased by the resources that were related to the student reading achievement.

The effectiveness analyses was separated into two general groups. The first group was used to determine which of the policy variables under investigation discriminated between the high and low achieving sites. The second group of analyses was concerned with each of the individual variables that were identified by the first group of analyses. The various sites were divided into either: 1) two groups reflecting a high degree or a low degree of the policy variable being studied (in the case of quantitative variables) or 2) groups representing the various categories of the policy variable (in the case of qualitative variables). The reading achievement gains observed for these various groups were then examined to determine if reading achievement varied according to these groups. In this way, the data gathered during any given year of the Cost-Effectiveness Study was analyzed twice.

The results of the first year of the Cost-Effectiveness Study showed that 45 variables varied significantly between the high and low study sites. Since these sites were selected on the basis of 1972-73 reading achievement data, it was desired to determine if any of these 45 variables were related to the 1973-74 reading achievement results. Further analyses indicated that 17 of the 45 variables were significantly related to the 1973-74 reading achievement results. The 1974-75 data analyses examined, where possible, the 45 variables from the first year of the study to determine if they were related to reading achievement based upon the second year results. These variables were examined with respect to the high and low achieving sites (which were based upon 1973-74 achievement data) and with respect to the 1974-75 reading achievement. Thus, over a period of two years, there were four separate analyses which examined the relationship between the 45 variables previously mentioned and reading achievement.

Those variables which were found to be significantly related to reading achievement in three of the four analyses were considered to be variables whose relationship to reading achievement were considered to be educationally significant.

In addition to the 45 variables discussed above, there are variables which were modifications of variables used in the first year of the study and variables that were completely new to the study in the second year. These variables were analyzed by determining if they were related to high and low achieving sites and then also to determine if they were related to 1974-75 achievement results. Thus, these variables were analyzed only twice. Of these variables, it was determined to focus upon those which were found to be significantly related to reading achievement for both of the analyses.

There were 36 such variables. An examination of the 36 variables indicated that there were five general categories into which most of these variables could be classified.

Eleven variables or groups of variables were found, over one or both years of the study, to be significantly related to reading achievement. The remainder of the effectiveness analysis was concerned only with these 11 variables or groups of variables. The group of variables representing professional staff involvement was dropped because no single measure characterizing this group of variables has been identified. A group of variables concerning the extent of paraprofessional involvement was dropped in favor of a variable representing the nature of paraprofessional involvement. Finally, the variables pertaining to the number of hours teachers spend at school daily and the fraction of materials selected by the compensatory education teacher were dropped. These variables were dropped because they were not significantly related to reading achievement on the fourth and last of the analyses. The data, primarily correlation coefficients, for the remainder of the effectiveness analyses was obtained from the fourth series of analyses. Without a significant correlation between these variables and reading achievement it was decided not to use them in the path analysis. Thus, the final set of analyses was performed on eight variables including reading achievement gains.

To determine the nature of the relationships between those eight variables, it was decided to use path analysis as described in Multiple Regression and Behavioral Research, Kerlinger and Pedhazur. Path analysis is not a means of identifying causes but

a means of determining which of various proposed explanations of reality best fit the data at hand. Path analysis could yield different results with a different set of data. Path analysis does assist the researcher in determining which of various explanations best fit the available data.

While many models were examined, one model was shown to possess a high degree of agreement between the correlation coefficients and their respective reproduced correlations. While Model 12, presented in Figure 4, did represent the best fit with the data at the point in time it was developed, further path analyses were performed. However, no other model was found which gave a higher degree of agreement between the correlation coefficients and their respective reproduced correlations. It was decided that Model 12 represented a sufficiently accurate model of reality as represented by the data available. This is not to say that further analyses would not find a model which would better fit the data. Moreover, it is now a challenge to demonstrate, through systematic analysis, that there is another model which better fits reality.

Conclusions

1. A set of procedures have been developed which when implemented can:

   a) identify those costs, in terms of resources used, which may be associated with a desired educational product,

   b) identify those policy variables which may be associated with a desired educational product, and

   c) identify the most plausible model(s) which describes the nature of the association between the policy variable and educational product.

2. It has been shown that for extremely high and extremely low achieving compensatory education reading programs in Michigan:

   a) higher per pupil program costs are associated with higher

reading achievement, and

b) certain policy variables, see Figure 5, page 78, do appear to have significant impacts on student compensatory education reading achievement. The variables Teacher Morale, Degree of Accountability, and Involvement of Paraprofessionals were the only variables which were shown to have direct impact on student reading achievement.

Recommendation

It is recommended that the results of the Michigan Cost-Effectiveness study be implemented on a pilot basis in a small number of schools where student reading achievement is low. The goal of the pilot implementation would be to determine if student reading achievement can be raised as a result of changes based upon the Cost-Effectiveness Study results.

APPENDICES

APPENDIX A

LIST OF VARIABLES, NEW OR CHANGED IN THE SECOND YEAR OF THE STUDY, WHICH WERE FOUND TO BE SIGNIFICANTLY RELATED TO READING ACHIEVEMENT

GROUP A -- STAFF VARIABLES

1-2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship To Reading Achievement**
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
1 - 1000	Whether the coop ed * Director taught reading at any level in a school setting	2 = yes 1 = no	25	92% of highs responded yes		23	61% of lows responded yes		(4.93)		.03	+
2 - 4003	Regular teacher's * highest degree level held	6 = Ph.D. 5 = Spec. 4 = Masters 3 = Bachelor 2 = Assoc. 1 = None	191	3.35	.49	165	3.23	.46	2.37	2	.02	+
3 - 4004	Regular teacher's * semester hours in reading methods and materials	as indicated	187	10.50	8.18	161	12.59	11.10	-2.01	2	.05	-
4 - 4005	Regular teacher's semester hours in reading survey	as indicated	187	4.05	4.35	161	5.69	5.70	-3.04	2	.003	-
5 - 5003	Paraprofessional's highest level of formal education completed	5 = beyond bachelor 4 = bachelor 3 = assoc. 2 = high sch 1 = some high sch	72	2.44	1.02	112	2.09	.48	3.19	2	.002	+

* These varibles were significantly related to reading achievemant on both 1974-75 comparison with reading achievement.

** + = more of factor was associated with increased success.
- = less of factor was associated with increased success.

GROUP B -- ORGANIZATION AND MANAGEMENT OF PROGRAM

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement**
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
6 - 1136N	Whether the District* has implemented the "Develop Performance Objectives" stage of the Michigan Accountability Model	1 = yes 0 = no	25	.92	.28	23	.65	.49	2.37 (3.71, 1 d.f.)	1	.01 (.05)	+
7 - 1137N	Whether the District has implemented the "Conduct Needs Assessment" stage of the Michigan Accountability Model	1 = yes 0 = no	25	.92	.28	23	.65	.49	2.37 (3.71, 1 d.f.)	1	.01 (.05)	+
8 - 1138N	Whether the District has implemented the "Analyze Delivery System" stage of the Michigan Accountability Model	1 = yes 0 = no	25	.88	.33	23	.61	.50	2.24 (3.37, 1 d.f.)	1	.02 (.07)	+
9 - 1139N	Whether the District* has implemented the "Test and Evaluate" stage of the Michigan Accountability Model	1 = yes 0 = no	25	.96	.20	23	.74	.45	2.23 (3.08, 1 d.f.)	1	.02 (.08)	+
10 - 1140N	Whether the District* has implemented the "Recommend for Improvement" stage of the Michigan Accountability Model	1 = yes 0 = no	25	.92	.28	23	.74	.45	1.69 (1.67, 1 d.f.)	1	.05 (.19)	+
11-ACCOUNT	Degree to which the* District has implemented the Michigan Account-ability Model	6 = highly implemented . . . 0 = not implemented	25	5.56	1.04	23	4.26	1.74	3.17	1	.002	+

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
12 -1141/ 1143	Whether private firms* played any role in the District's program other than selling materials in 1974-75	2 = yes 1 = no	25	84% of highs responded no		23	52% of lows responded no		(4.26)		.04	-
13 - 1142/ 1144	Whether private firms played any role in the District's program other than selling materials in 1973-74	2 = yes 1 = no	25	92% of highs responded no		23	57% of lows responded no		(6.26)		.01	-
14 - 1142	Whether private firms* played any role in the District's designated high achieving building's program other than selling materials in 1973-74	2 = yes 1 = no	25	92% of highs responded no		23	56% of lows responded no		(6.26)		.01	-
15 - 1144	Whether private firms* played any role in the District's designated low achieving building's program other than selling materials in 1973-74	2 = yes 1 = no	25	8% of highs responded no		23	56% of lows responded no		(4.52)		.03	-
16 - 1157	Degree of autonomy the district's school buildings have over staff decisions within that building	4 = very little . . . 1 = absolute say so	24	2.25	.85	23	2.61	.58	1.68	1	.05	+
17 - 1172	Changes in approximate costs	complex relationship	6			7			(6.96)		.03	
18 - 2108	Number of discussions* principal had with district's Comp Ed Director in last 12 months concerning reading activities of school's comp ed students	as indicated	46	29.0	38.67	41	17.0	24.10	1.80	1	.04	+

GROUP B -- ORGANIZATION AND MANAGEMENT OF PROGRAM (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
19 - 2109	Percent of above such discussions initiated by the Director	as indicated	44	70.8	21.83	35	60.3	25.64	1.96	1	.03	*
20 - 2114	Strength of teaching staff's support of comp ed reading activities in school	5 = over whelmingly . . . 1 = some-what weakly	50	4.12	.63	45	3.87	.66	1.92	1	.03	*
21 - 2116	Principal's assessment of comp ed teacher's involvement in organizing the classroom	5 = heavily involved . . . 1 = not involved at all	42	4.33	1.05	39	3.44	1.67	2.92	1	.003	*
22 - 2118	Principal's assessment of comp ed teacher's involvement in reviewing/selecting performance objectives	5 = heavily involved . . . 1 = not involved at all	42	4.21	1.09	39	3.49	1.54	2.47	1	.008	*
23 - 2123	Principal's assessment of para-professional's involvement in selecting materials	5 = heavily involved . . . 1 = not involved at all	35	1.89	1.13	44	2.48	1.02	2.44	1	.008	-
24 - 2128	Whether any "Other Staff" besides the teachers, paraprofessionals, and the principal are involved with organizing the classroom, selecting materials or reviewing/selecting performance objectives	2 = yes 1 = no	49	69% of highs responded yes		46	41% of lows responded yes		(6.49)		.0[illegible]	*

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
25 - 2130	Principal's assessment of "Other Staff's" involvement in organizing the classroom	5 = heavily involved . . . 1 = not involved at all	16	3.63	1.41	23	2.65	1.50	2.05	1	.02	*
26 - 2140	Principal's assessment of "Other Staff's" involvement in reviewing/ selecting performance objectives	5 = heavily involved . . . 1 = not involved at all	0	0	0	4	2.50	1.73	-2.89	1	.03	-
27 - 2142	Principal's satisfaction with the methods by which comp ed and regular teachers coordinate their reading activities for comp ed students	5 = extremely satisfied . . . 1 = very dissatisfied	48	4.23	.95	45	3.80	1.01	2.11	1	.02	*
28 - 3100	Number of discussions comp ed teacher had with the district comp ed director in the last 12 months concerning comp ed student's reading activities	as indicated	46	30.2	42.82	40	8.2	12.51	3.14	1	.003	*
29 - 3103	Number of visits in last 12 months made by district director to observe comp ed student reading activities as reported by the comp ed teacher	as indicated	46	11.96	32.13	40	2.35	3.69	1.88	1	.03	*
30 - 3111	Feedback given to comp ed teacher by principal	complex relationship	26			24			(10.45, 3 d.f.)		.02	

GROUP B -- ORGANIZATION AND MANAGEMENT OF PROGRAM (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
31 - 3114	Whether a non-comp ed reading specialist or consultant is assigned to comp ed teacher's school	2 = yes 1 = no	46	22% of highs responded yes		38	45% of lows responded yes		(4.05)		.04	-
32 - 3118	Number of visits this person (above) made to comp ed teacher's classroom in last 12 months to observe reading activities of the comp ed students	as indicated	12	2.25	3.7[illegible]	17	.35	.86	2.05	1	.03	+
33 - 3124	Comp ed teacher's satisfaction with method by which comp ed and regular teachers coordinate their reading activities for comp ed students	5 = extremely satisfied . . . 1 = very dissatisfied	47	3.98	.82	38	3.37	1.10	2.93	1	.002	+
35 - 3128	% of all testing programs involving comp ed teacher's comp ed students that provide test results to comp ed teacher within 1 month of administration	as indicated	47	66.8	40.61	40	51.4	45.43	1.67	1	.04	+

GROUP B -- ORGANIZATION AND MANAGEMENT OF PROGRAM (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
36 - 4107	Percent of discuss-* ions held in last 12 months between the regular teacher and principal initiated by the principal	as indicated	128	51.3	32.36	108	59.8	30.73	-2.07	1	.02	-
37 - 4112	Regular teacher's assessment of the effectiveness of the principal's support of this regular teacher's comp ed reading activities	5 = very effectively . . . 1 = very ineffectively	182	4.31	.93	158	4.13	1.01	1.77	1	.04	+
38 - 4113	Basis of judging the above	complex relationship	177			147			(13.21, 5 d.f.)		.02	
39 - 4114	Whether a non-comp ed reading specialist or consultant is ass'nd to the regular teacher's school	2 = yes 1 = no	189	30% of highs responded yes		163	54% of lows responded yes		(19.54)		less than .001	-
40 - 4115	Number of discuss-ions held in last 12 months between regular teacher and special reading consultant (above) concerning reading activities of regular teacher's comp ed students	as indicated	57	42.0	75.7	93	21.0	35.60	2.32	1	.01	+
41 - 4116	% of the above * discussions initiated by this special consultant	as indicated	51	46.7	23.61	73	59.0	29.05	-2.50	1	.007	-

GROUP B -- ORGANIZATION AND MANAGEMENT OF PROGRAM (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
43 - 5103	Method by which school staff members coordinate their reading activities as reported by paraprofessionals	complex relationship	72			112			(14.15, 4 d.f.)		.007	
44 - 6100	Role played by other staff person in comp ed reading at school	complex relationship	20			17			(17.67, 5 d.f.)		.003	

GROUP C -- ORGANIZATION AND MANAGEMENT OF CLASSROOM READING ACTIVITIES

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement**
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
45 - 3205	Comp ed teacher's degree of involvement in the determination of which students would be provided comp ed assistance	5 = very much involved . . . 1 = not involved at all	47	4.23	1.18	40	3.23	1.80	3.13	1	.001	+
46 - 4205	Regular teacher's * degree of involvement in determination of which students would be provided comp ed assistance	5 = very much involved . . . 1 = not involved at all	191	3.78	1.47	165	3.06	1.64	4.37	1	less than .001	+
47 - 5200	Manner in which paraprofessional's time is utilized in comp ed reading activities	complex relationship	71			112			(15.40, 4 d.f.)		.004	

GROUP D -- METHOD OF INSTRUCTION

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement**
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
48 - 1303/ 1311	Second most prevalent type of instruction used in comp ed reading activities in district in 1974-75	complex relationship	8			12			(8.75, 3 d.f.)		.03	
49 - 1303	Second most prevalent type of instruction used in comp ed reading activities in district designated high achieving building	complex relationship	8			11			(7.92, 3 d.f.)		.05	
50 - 1304/ 1312	Types of instruction used in comp ed reading activities in district in 1973-74	complex relationship	25			23			(10.46, 3 d.f.)		.02	
51 - 1304	Type of instruction used in comp ed reading activities in district's designated high achieving building in 1973-74	complex relationship	25			23			(7.86, 3 d.f.)		.05	
52 - 1312	Type of instruction used in comp ed reading activities in district's designated low achieving building in 1973-74	complex relationship	25			23			(10.46, 3 d.f.)		.02	
53 - 3311	Whether motion pictures are supplementary to the comp ed teacher's reading activities	2 = yes 1 = no	47	28% of highs responded	yes	40	58% of lows responded	yes	(6.75)		.009	-
54 - 3318	Type of other basic material used in reading activities by the comp ed reading teacher	complex relationship	4			3			(7.00, 2 d.f.)		.03	

GROUP D -- METHOD OF INSTRUCTION (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
55 - 3324	% of comp ed reading* time with the comp ed teacher spent introducing new topics	as indicated	47	9.34	9.28	40	5.95	5.53	2.02	1	.02	+
56 - 3335	Degree to which comp ed teacher relies upon programmed instruction	5 = heavily . . . 2 = do not use it 1 = not familiar with it	47	3.13	.90	40	3.63	1.28	-2.13	1	.02	-
57 - 3344	Whether comp ed teacher groups comp ed students during reading activities	2 = yes 1 = no	47	6% of highs responded yes		40	28% of lows responded yes		(5.66)		.02	-
58 - 3347	Whether small group is usually led by a parent volunteer during the comp ed teacher's comp ed reading activities	2 = yes 1 = no	46	0% of highs responded yes		40	13% of lows responded yes		(4.04)		.04	-
59	**There is no variable associated with variable number 59 in this exhibit. Originally a study variable was included in this space, but during preparation of the report it was discovered that the significance level of this variable was 0.06, thus placing it outside the scope of this exhibit. It was decided to simply omit variable number 59 from the exhibit rather than renumber all subsequent variables listed in order to save editorial and typing time needed for completion of this lengthy document. The reader will note that even though the variable with the highest variable number in this exhibit is variable 122, there are only 121 variables listed. The discussion in the text reflects this actual total of 121 variables.***											
60 - 3353	Time per day per comp ed reading group during comp ed teacher's reading activities	5 = >60 min. 4 = 45-60 min. 3 = 30-45 min. 2 = 15-30 min. 1 = < 15 min.	40	2.65	.66	27	3.04	.94	-1.98	1	.03	-
61 - 3355	Degree to which comp ed reading teacher uses silent reading in comp ed reading activities	7 = almost all the time . . . 4 = occassnly . 2 = do not use it 1 = unfamiliar with it	47	4.83	1.13	39	5.59	1.04	-3.21	1	.001	-

GROUP D -- METHOD OF INSTRUCTION (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
62 - 3366	Degree to which comp ed teacher uses cognitive mapping in comp ed reading activities	7 = almost all the time . . 4 = occassnly . . . 2 = don't use it 1 = not familiar with it	47	2.62	1.53	39	3.41	1.62	-2.34	1	.01	-
63 - 4303	Whether commerical texts are used by the regular teacher as supplementary materials in comp ed reading activities	2 = yes 1 = no	191	31% of the responded	highs yes	165	47% of the responded	lows yes	(8.68)		.003	-
64 - 4324	% of comp ed reading time in the regular classroom spent introducing new topics	as indicated	189	11.77	9.60	164	10.05	8.43	1.77	1	.04	+
65 - 4332	Degree to which the regular reading teacher relies upon basal texts as an approach to teaching reading	5 = heavily . . . 2 = don't use it 1 = not familiar with it	191	4.40	.90	164	4.19	.94	2.19	1	.02	+
66 - 4335	Degree to which the * regular reading teacher relies upon programmed instruction as an approach to teaching reading	see variable 4332	191	2.92	1.16	164	3.15	1.24	-1.81	1	.04	-
67 - 4338	Degree to which the * regular reading teacher relies upon the "language experience approach" to teach reading	see variable 4332	191	14% of the highs responded "Don't use it"		164	7% of the lows responded "Don't use it"		(9.90, 4 d.f.)		.04	-

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
68 - 4345	Whether regular teacher's small group comp ed reading activities are usually led by a student	2 = yes 1 = no	191	9% of the highs responded yes		165	19% of the lows responded yes		(5.77)		.02	-
69 - 4346	Whether regular* teacher's small group comp ed reading activities are usually led by a paraprofessional	2 = yes 1 = no	191	10% of the highs responded yes		165	27% of the lows responded yes		(16.86)		less than .001	-
70 - 4349	Whether regular teacher's small group comp ed reading activities are usually led by a reading consultant or specialist	2 = yes 1 = no	191	2% of the highs responded yes		165	7% of the lows responded yes		(4.39)		.04	-
71 - 4363	Degree to which the regular classroom teacher emphasizes interrelationships in paragraphs as a technique in teaching reading	7 = almost all the time . . . 4 = occassnly . . 2 = don't use it 1 = not familiar with it	191	1% of the highs responded with "use it most of the time or almost all the time"		164	25% of the lows responded with "use it most of the time or almost all the time"		(13.22, 6 d.f.)		.04	-
72 - 4368	Degree to which the regular classroom teacher uses attention span exercises as a technique to teach reading	see variable 4363	191	4.32	1.49	164	4.65	1.46	-2.09	1	.02	-

GROUP E -- STAFF DEVELOPMENT SPECIFICALLY RELATED TO COMPENSATORY EDUCATION READING ACTIVITIES

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement**
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
73 - 1411/ 1428	Number of para-professional train-ing days reported by the district director in which the principal was involved 1974-75	as indicated	13	1.19	1.03	13	2.85	2.85	-1.97	1	.03	-
74 - 1428	Number of para-professional train-ing days reported by the district director in which the principal of the district designated low achieving building was involved	as indicated	15	1.30	1.07	13	2.85	2.85	1.95	1	.03	-
75 - 2401	Number of days of specifically related teacher training for school staff at the outset of the comp ed program	as indicated	49	8.33	13.11	45	3.46	5.21	2.33	1	.01	+
76 - 2407	Number of 1974-75 teacher training days comp ed director was involved as reported by the principal	as indicated	34	8.47	13.16	29	2.73	4.91	2.22	1	.02	+
77 - 2409	Number of days of specifically related paraprofessional training for school staff in 1974-75	as indicated	43	2.57	3.82	45	5.00	8.41	-1.73	1	.04	-
78 - 2410	Number of days of specifically related paraprofessional training for school staff at the outset of the comp ed program	as indicated	42	2.61	5.15	45	6.08	12.46	-1.68	1	.05	-

GROUP E -- STAFF DEVELOPMENT SPECIFICALLY RELATED TO COMPENSATORY EDUCATION READING ACTIVITIES (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
79 - 2415	Number of 1974-75 * paraprofessional training days comp ed director was involved as reported by the principal	as indicated	24	3.52	4.80	29	1.41	2.03	2.15	1	.02	+
80 - 4406	Regular reading teacher's assessment of training provided at the outset of the comp ed program	5 = very effective . . . 1 = very ineffective	67	3.87	.89	56	3.54	1.03	1.91	1	.03	+
81 - 5400	Number of days of specifically related training provided the paraprofessional in 1974-75	as indicated	72	2.24	4.31	112	5.16	7.85	-2.89	1	.002	-

GROUP F -- STUDENT VARIABLES

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement*
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
82 - 1500	Percent of district's total enrollment served by comp ed programs	as indicated	25	11.40	9.14	23	22.70	19.61	-2.58	2	.01	-
83 - 3503	Comp ed teacher's assessment of comp ed student competitive-ness relative to all other students	5 = almost all try to exceed peers . . 1 = almost none	47	28% of the highs responded "most-almost all"		37	54% of the lows responded "most-almost all"		(12.16, 4 d.f.)		.02	-
84 - 3504	Comp ed teacher's assessment of the degree to which his/her comp ed students like school	5 = very much . . 1 = not at all	47	0% of the highs responded "not much"		40	13% of the lows responded "not much"		(9.31, 3 d.f.)		.03	+
85 - 4505	Percent of regular teacher's comp ed students that the regular classroom teacher expects to complete high school	as indicated	191	70.20	23.21	165	65.60	25.80	1.78	1	.04	+

GROUP G -- SCHOOL AND DISTRICT VARIABLES

1 - 1	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement**
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
86 - 1602	Degree to which role played by Tax Groups is integral and important in the district	3 = very active 2 = interested 1 = no part	20	30% of the highs responded "very active"		18	6% of the lows responded "very active"		(8.15, 2 d.f.)		.02	+
87 - 1609	Frequency of information sent to parents	5 = more than once a week 4 = regularly once a week 3 = monthly 2 = quarterly 1 = as needed	24	3.21	1.29	22	2.60	1.14	1.72	1	.05	+
88 - 1611	Total strike days in last two years in district	as indicated	25	3.84	7.84	23	10.50	16.19	-1.84	1	.04	-
89 - 2600	Number of parents attending a typical PTA meeting	as indicated	50	51.20	82.66	46	22.40	27.28	2.25	1	.01	+
90 - 2601	% of total school parents that attend a typical PTA meeting	as indicated	50	12.80	17.98	45	7.50	10.02	1.76	1	.04	+
91 - 2603	Principal's postulated reasons for the condition of the teacher morale in the school	complex relationship	48			44			(12.94, 6 d.f.)		.04	
92 - 4600	Regular classroom teacher's assessment of teacher morale in school	5 = extremely high . . . 1 = extremely low	191	3.97	.96	165	3.77	1.00	1.97	1	.03	+

GROUP G -- SCHOOL AND DISTRICT VARIABLES (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
93 - 5600	Paraprofessional's assessment of the paraprofessional's morale in the school	5 = extremely high . . . 1 = extremely low	72	4.46	.65	112	4.26	.84	1.72	1	.04	*
94 - ADJINC (counted as part of Director's file)	Adjusted median family income in the district (in dollars) = $\frac{[100 - \text{Var. No. } 82]}{100} \times$ (median family income in district)	as indicated	25	8904.30	1877.72	23	7512.78	2009.11	2.48	2	.02	*

GROUP H -- UTILIZATION OF STAFF TIME

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement*
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
95 - 2714	Principal's percent* of time in other (non-comp ed) decision making	as indicated	50	19.00	14.15	46	12.87	10.58	2.39	1	.009	+
96 - 2722	Additional days beyond students' attendance days included in paraprof-essional's agreement or understanding this year	as indicated	48	.75	1.77	45	1.78	2.52	-2.29	2	.03	-
97 - 2724	Length of typical* school day for student excluding lunch	as indicated	50	5.84	.60	46	5.51	.47	3.04	2	.003	+
98 - 3701	Minutes of reading instruction per day per comp ed student in the regular classroom	as indicated	47	36.40	25.49	40	78.53	65.45	-4.07	2	less than .001	-
99 - 3708	Comp ed teacher's total hours of non-instructional student contract weekly	as indicated	47	1.32	1.93	40	3.31	5.49	-2.32	2	.02	-
100 - 3711	Comp ed teacher's percent of available time spent in plan-ning other activities	as indicated	47	4.74	8.75	40	9.08	11.46	-2.00	1	.02	-
101 - 4713	Regular teacher's percent of available time spent in train-ing in areas other than comp ed	as indicated	188	3.13	5.25	162	2.22	4.18	1.77	1	.04	+
102 - 4715	Regular teacher's percent of available time spent in all other decision making except comp ed	as indicated	188	11.08	10.17	162	8.06	8.42	3.00	1	.002	+

GROUP H -- UTILIZATION OF STAFF TIME (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
103 - 6709	"Other Staff's" percent of available time spent in planning other activities (non- comp ed)	as indicated	20	8.85	14.20	15	20.53	21.69	-1.93	1	.03	-
104 - 6711	"Other Staff's" percent of available time spent in training in other areas (non- comp ed)	as indicated	20	1.70	3.54	15	6.60	5.87	-3.07	1	.002	-
105 - 6716	"Other Staff's" percent of available time spent in other activities (non-comp ed)	as indicated	20	21.65	28.75	15	8.07	12.66	1.71	1	.05	*

GROUP I -- MISCELLANEOUS CHARACTERISTICS

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
Variable Number - Variable Ref. Number	Variable Description	Coding	HIGH SITES			LOW SITES			t Value (Chi-Square)	No. of Tails	Signif-icance	Variable Relationship to Reading Achievement*
			No. of Respondents	Mean	s.d.	No. of Respondents	Mean	s.d.				
106 - 2841	Number of full-time equivalent comp ed instructors for gr. 1 1974-75	as indicated	49	.19	.19	46	.47	.97	-2.01	2	.05	-
107 - 2846	Number of full-time equivalent comp ed instructors for gr. 6 1974-75	as indicated	49	.08	.14	45	.23	.46	-2.05	2	.04	-
108 - 2855	Total number of comp ed paraprofessionals for all grades K-6 1974-75	as indicated	50	2.40	2.39	45	5.15	6.14	-2.94	2	.004	-
109 - 2857	Number of full-time equivalent comp ed paraprofessionals for gr. 1, 1974-75	as indicated	50	.44	.77	46	.87	.91	-2.53	2	.01	-
110 - 2859	Number of full-time equivalent comp ed paraprofessionals for gr. 3, 1974-75	as indicated	50	.44	.65	46	.81	.93	-2.28	2	.03	-
111 - 2860	Number of full-time equivalent comp ed paraprofessionals for gr. 4, 1974-75	as indicated	50	.31	.37	46	.69	.95	-2.61	2	.01	-
112 - 2862	Number of full-time equivalent comp ed paraprofessionals for gr. 6, 1974-75	as indicated	50	.12	.26	46	.42	.96	-2.10	2	.04	-
113 - 2863	Total number of full time equivalent comp ed paraprofessionals for all grades K-6, 1974-75	as indicated	50	2.26	2.63	45	4.61	5.86	-2.57	2	.01	-
114 - 3810	Number of students in classroom during comp ed reading	as indicated	45	6.76	3.88	40	11.35	9.41	-3.00	2	.004	-

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GROUP I -- MISCELLANEOUS CHARACTERISTICS (Cont'd)

1 - 2	3	4	5	6	7	8	9	10	11	12	13	14
115 - 3812	Number of parents assisting comp ed teacher without pay in comp ed activities this year	as indicated	47	.53	1.46	40	1.70	8.97	-1.88	1	.03	-
116 - 3816	Number of student volunteers from other schools assisting comp ed teacher without pay in comp ed activities this year	as indicated	47	.13	.49	40	.38	1.54	-2.30	1	.01	-
117 - 4800	Number of regular teachers assisting regular teacher in comp ed reading activities	as indicated	191	.26	.63	165	.41	1.03	-1.67	1	.05	-
118 - 4801	Number of special* comp ed reading teachers assisting regular teacher in comp ed reading activities	as indicated	191	.88	.63	165	.73	.60	2.34	1	.01	+
119 - 4802	Number of paraprofes* sionals assisting regular teacher in comp ed reading activities	as indicated	191	.95	1.02	165	1.15	.80	-1.96	1	.03	-
120 - 4810	Number of students ... classroom during comp ed reading activities	as indicated	187	24.02	5.28	165	25.84	7.46	-2.66	2	.008	-
121 - 4812	Number of parents assisting regular teacher without pay in comp ed activities this year	as indicated	191	.24	.71	165	.65	1.84	-2.82	1	.003	-
122 - 4822	Number of other community persons ...sisting regular teacher without pay in comp ed activities this year	as indicated	191	.01	.07	165	.09	.49	-2.38	1	.009	-

APPENDIX B

DISTRICTWIDE AND SCHOOL-LEVEL BACKGROUND CHARACTERISTICS FOR THE SUCCESSFUL AND UNSUCCESSFUL TITLE I AND CHAPTER 3 SITES

1974-75 DISTRICTWIDE BACKGROUND DATA FOR TITLE I SITES

BACKGROUND DATA ITEM	SUCCESSFUL SITES n=18 MEAN	S.D	UNSUCCESSFUL SITES n=16 MEAN	S.D
Median Family Income in the District, Dollars Annually	9,956	1769.3	9,475	1365.5
Total General Fund Expenditure ($) per Student	1,235	264.6	1,117	207.2
Total Compensatory Education Expenditures ($) per Compensatory Education Student (Title I for Title I sites, Chapter 3 for Chapter 3 sites)	370	117.7	437	386.7
Number of Title I students	292	507.6	434	734.2
Number of Chapter 3 students	175	538.6	373	719.7
District Enrollment				
Kindergarten	300	202.0	315	362.4
Grades 1-6	1,845	1386.6	1,878	2254.9
Grades 7-12	1,920	1294.0	1,933	2240.0
K-12	4,064	2844.8	4,125	4850.5
Number of Elementary Schools in the District	6	5.0	6	6.7
Number of Title I Elementary Schools	4	3.3	4	2.4
Number of Chapter 3 Elementary Schools	2	5.4	3	7.6
Number of Elementary Schools Which are Both Title I and Chapter 3	1	3.6	2	3.4

1974-75 DISTRICTWIDE BACKGROUND DATA FOR CHAPTER 3 SITES

	SUCCESSFUL SITES n=7		UNSUCCESSFUL SITES n=5	
BACKGROUND DATA ITEM	MEAN	S.D	MEAN	S.D
Median Family Income in the District, Dollars Annually	10,181	1269.7	10,143	1356.7
Total General Fund Expenditure ($) per Student	1,410	321.7	1,270	275.8
Total Compensatory Education Expenditure ($) per Compensatory Education Student (Title I for Title I sites, Chapter 3 for Chapter 3 sites)	194	8.1	189	10.9
Number of Title I Students	519	372.7	539	237.7
Number of Chapter 3 Students	658	390.2	727	256.0
District Enrollment				
Kindergarten	422	260.7	308	70.7
Grades 1-6	2,324	1416.2	1,782	412.5
Grades 7-12	2,275	1355.9	1,600	245.7
K-12	5,021	3025.1	3,689	703.9
Number of Elementary Schools in the District	7	4.5	6	2.6
Number of Title I Elementary Schools	4	1.3	5	1.3
Number of Chapter 3 Elementary Schools	7	4.5	6	2.1
Number of Elementary Schools Which Are Both Title I and Chapter 3	4	1.3	4	1.1

APPENDIX C

SUMMARY OF COST METHODOLOGY

SUMMARY OF COST METHODOLOGY

1. Identify the functions or activities for which cost estimates are to be determined

   a) Those involving student tiem directly (i.e., classroom reading activities)

   b) Those not requiring student time directly but required in a supportive sense (i.e., Compensatory Education Planning, Compensatory Education Training, Compensatory Education Decision Making, and Compensatory Education Administration).

2. Determine the total amount of time these activities take place during the entire school year

   a) For student contact activities this could be the number of hours of such activities provided any given student over the entire year, e.g., one hour of reading instruction per day for 180 days means 180 hours of such instruction

   b) For supportive activities this would be the total hours of such service provided over a full school year by whichever personnel provide the service for the longest time each day, e.g., 8 hours per day for 180 days would be 1,440 hours per year.

3. Determine which personnel are required for each type of activity:

   a) District Compensatory Education Director

   b) Principal

   c) Compensatory Education Teachers

   d) Regular Classroom Teachers

   e) Paraprofessionals

   f) Others.

4. Determine how many hours of service are provided by each participating classification of personnel in each activity, e.g., compensatory education teachers providing 4 hours of compensatory education reading daily, regular teachers providing 1.5 hours of reading daily.

These hours are obtained either directly from specific responses or derived from a series of responses dealing with the allocation of appropriate blocks of time to the variety of activities listed.

5. Associate a dollar cost to the amounts of time delineated (as just described) by allocating the appropriate portion of the total salary and fringe costs for each classification of personnel to the hours devoted by those personnel to each activity.

6. Convert all personnel costs to a per pupil basis for each activity by dividing the dollars cost for each personnel in each activity by the number of students served by that classification of personnel in that activity. Sum all per pupil personnel costs by classification to obtain a total personnel cost per pupil for each activity.

7. Assign all non-personnel costs to the activities under study by the best available means for allocating these costs to these activities. In most cases no allocation decision is needed since budgets may show lump sums for reading material, training materials, or administrative materials.

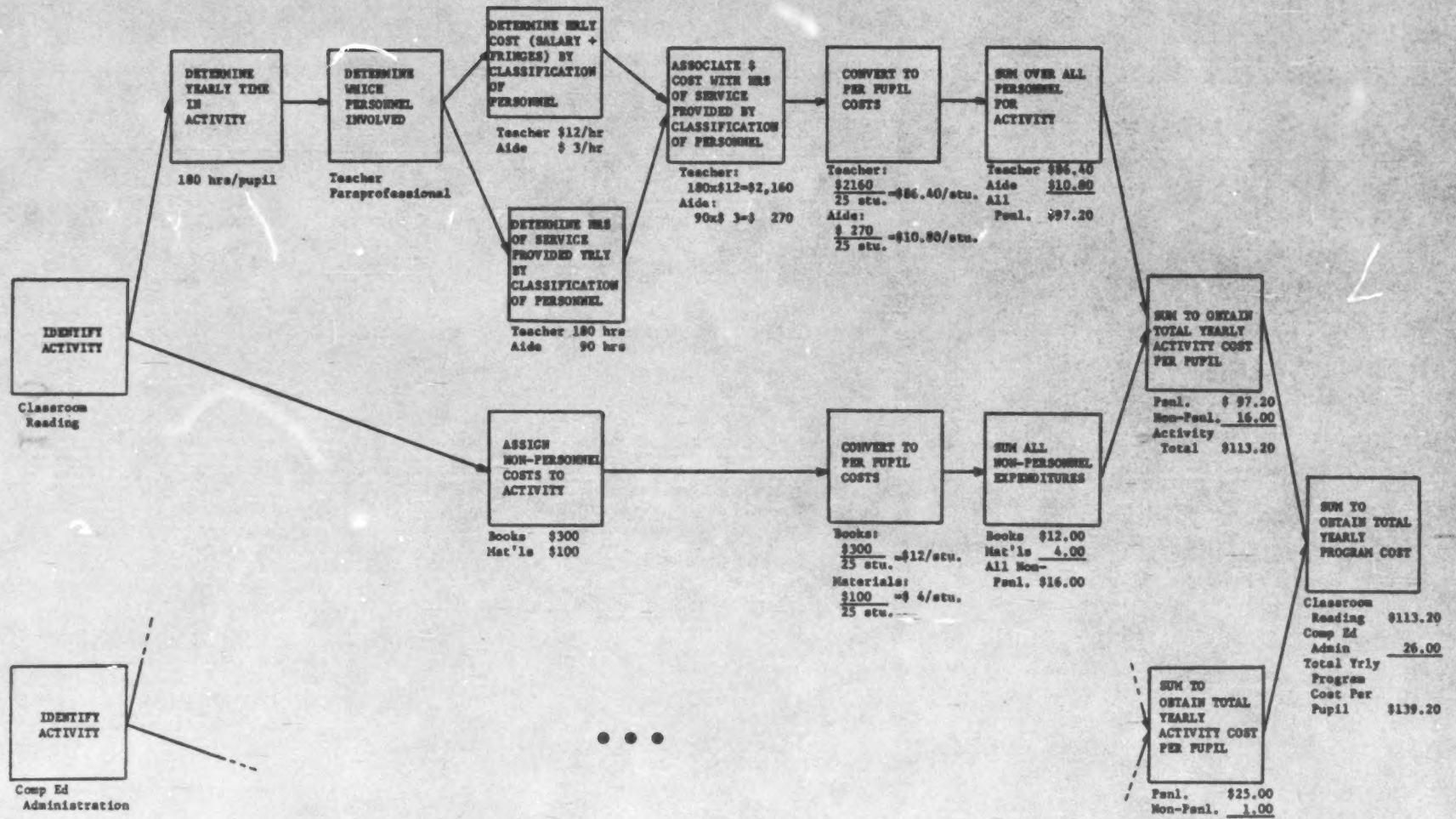
8. Convert all non-personnel costs to a per pupil basis by dividing the non-personnel costs for each activity by the appropriate number of students served. Sum all per pupil non-personnel costs by type of expenditure to obtain a total non-personnel cost per pupil for each activity.

9. Sum personnel plus non-personnel per pupil costs for each activity to obtain a total resources cost per pupil (annually) per activity.

10. Sum these costs over all activities to obtain a total program cost per pupil (annually).

11. The attached chart displays the above steps in graphic form.

12. Also attached is a description of further specific details of the COST-ED methodology.


IDENTIFY ACTIVITY
Classroom Reading
DETERMINE YEARLY TIME IN ACTIVITY
180 hrs/pupil
DETERMINE WHICH PERSONNEL INVOLVED
Teacher
Paraprofessional
DETERMINE HRLY COST (SALARY + FRINGES) BY CLASSIFICATION OF PERSONNEL
Teacher $12/hr
Aide $ 3/hr
DETERMINE HRS OF SERVICE PROVIDED YRLY BY CLASSIFICATION OF PERSONNEL
Teacher 180 hrs
Aide 90 hrs
ASSOCIATE $ COST WITH HRS OF SERVICE PROVIDED BY CLASSIFICATION OF PERSONNEL
Teacher:
180x$12=$2,160
Aide:
90x$ 3=$ 270
CONVERT TO PER PUPIL COSTS
Teacher:
$2160 / 25 stu. =$86.40/stu.
Aide:
$ 270 / 25 stu. =$10.80/stu.
SUM OVER ALL PERSONNEL FOR ACTIVITY
Teacher $86.40
Aide $10.80
All Psnl. $97.20
SUM TO OBTAIN TOTAL YEARLY ACTIVITY COST PER PUPIL
Psnl. $ 97.20
Non-Psnl. 16.00
Activity Total $113.20
IDENTIFY ACTIVITY
Comp Ed Administration
ASSIGN NON-PERSONNEL COSTS TO ACTIVITY
Books $300
Mat'ls $100
CONVERT TO PER PUPIL COSTS
Books:
$300 / 25 stu. =$12/stu.
Materials:
$100 / 25 stu. =$ 4/stu.
SUM ALL NON-PERSONNEL EXPENDITURES
Books $12.00
Mat'ls 4.00
All Non-Psnl. $16.00
SUM TO OBTAIN TOTAL YEARLY ACTIVITY COST PER PUPIL
Psnl. $25.00
Non-Psnl. 1.00
Activity Total $26.00
SUM TO OBTAIN TOTAL YEARLY PROGRAM COST
Classroom Reading $113.20
Comp Ed Admin 26.00
Total Yrly Program Cost Per Pupil $139.20

APPENDIX D

BUDGET ANALYSES FOR 1974-75 MICHIGAN COST-EFFECTIVENESS SITES

Budget Analyses for 1974-75 Michigan Cost-Effectiveness Sites

The budget analyses to be conducted for each of the 1975 sites should follow a number of specific guidelines. Any amount identified for subsequent use in building the program cost models should have associated with it the following two notes:

a) Which group of students at that site are covered by that expenditure total?

e.g., all T-1
all C-3
all K-3
all K-6
all K-12
etc.

b) What subject area does the expenditure cover?

e.g., reading only

Where the subject area coverage is unspecified in the budget notes, it should be assumed that all subjects at the elementary level are included. Whenever all subjects are covered by any expenditure, no note to this regard is needed; all explanatory notes may be confined to allocation other that for all subjects inclusive.

The amount to be used should be the higher of the "budgeted" amount or the "expended to date" amount whenever the latter amount is available.

The attached list of specific notes should be referred to for each cost category used in the study.

NOTES ON BUDGET ANALYSES FOR 1975 MICHIGAN COST-EFFECTIVENESS SITES

COST CATEGORY	BUDGET SOURCE	NOTES
Compensatory Education Fringes	Comp Ed	a) "fixed charges" account or its equivalent = fringes (numerator); b) sum of "salaries" column = salary base
Fringes for all Regular Staff	General	a) specifically identified "fringe benefits" plus all employee-related "fixed charges" = fringes on all; b) sum of all relevant salaries (not including teacher substitutes) = salary base
Fringes for Regular Classroom Teachers	General	a) salaries for teacher subs = fringes; b) all teacher salaries = salary base
Compensatory Education Books and AV Software	Comp Ed	sum of "textbooks", "supplementary materials", "school library books and all other library expenses", and "teaching supplies and all other expenses for instruction" accounts or their equivalents
Regular Books and AV Software	General	all budgeted totals for textbooks, workbooks, teaching supplies, testing supplies, library books and periodicals, and AV software or materials (not equipment) that might include elementary reading, i.e., exclude art materials, music materials, etc.

COST CATEGORY	BUDGET SOURCE	NOTES
Miscellaneous Compensatory Education Training Expenses	Comp Ed	"inservice education" account or its equivalent
Miscellaneous Compensatory Education Administrative Expenses	Comp Ed	"contracted services and other expenses for administration" account or its equivalent
Compensatory Education AV Equipment	Comp Ed	"audiovisual instructional equipment" account or its equivalent
Other Compensatory Education Instructional Equipment	Comp Ed	"all other instructional equipment" account or its equivalent
Compensatory Education Administrative Equipment	Comp Ed	"all non-instructional equipment" account or its equivalent
Regular AV Equipment	General	specifically identified "audovisual equipment" replacements, capital outlays, or expenditures
Other Instructional Equipment	General	a) replacement of furniture and equipment sub-account of the maintenance of plant account where not specifically "audiovisual" and where it could be construed as instructional b) similarly, the furniture and equipment sub-account of the capital outlay account where not specifically "audiovisual" and where it could be construed as instructional

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